Summer 2018

# Missouri S&T Magazine Summer 2018

Missouri S&T Marketing and Communications Department

Miner Alumni Association

MISSOURI S&T MAGAZINE

SUMMER 2018 VOL. 92 NO. 2

# BEYOND MINING

## EXPLOSIVES ENGINEERING EMBRACES ROOTS — BUT EVOLVES WITH 21ST CENTURY FOCUS

MISSOURI S&T MAGAZINE

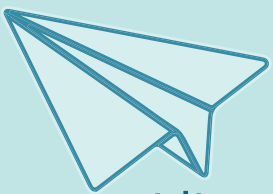
BEYOND MINING

SUMMER 2018 VOL. 92 NO. 2

# EASIER

## THAN EVER WITH

# E-RECEIPTS

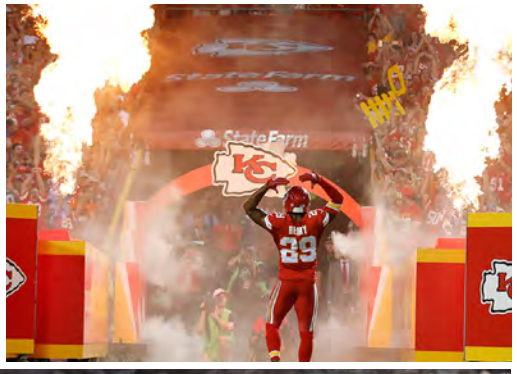


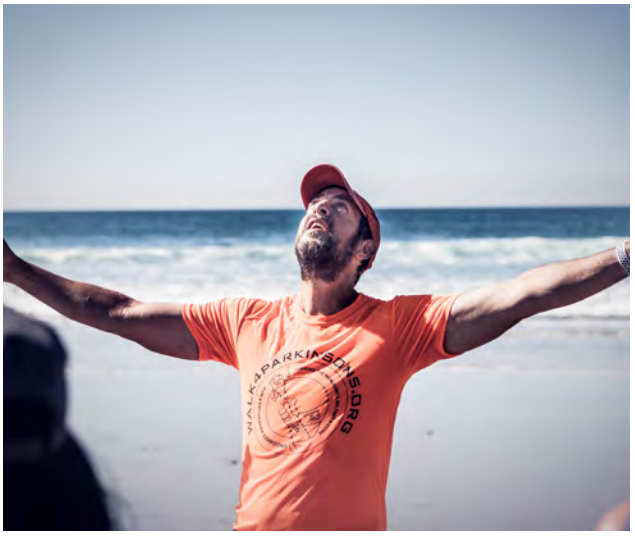
Missouri S&T and the Miner Alumni Association began providing electronic gift receipts on July 1 — giving you the advantage of immediate, paperless e-receipts to acknowledge your generosity.

Only donors who have provided email addresses will receive e-receipts. Those who have not will continue to receive paper receipts, although we encourage you to provide your email address and enjoy the ease of electronic receipting.

If we have your email address but you prefer to receive paper receipts, we're glad to provide them — just opt out by contacting **Patti Chism** at **chismp@mst.edu** or 573-341-4777.

**No matter how we convey our gratitude, we thank you for making a difference.**


## AROUND THE PUCK



## FEATURES



## BEYOND THE PUCK

# 1,196

Degrees awarded during May commencement ceremonies at Missouri S&T.

# 245

Employers at the spring 2018 Career Fair, a 20 percent increase over 2017 and a new spring record.

# 5,549

Missouri jobs supported by Missouri S&T. That figure includes 3,419 full-time and part-time jobs at Missouri S&T according to a University of Missouri System report released in April.

## MISSOURI S&T BY THE NUMBERS

# 1

The Missouri S&T Steel Bridge Team's first-place finish at the American Society of Civil Engineers' 2018 Mid-Continent Student Conference. The Concrete Canoe Team also fared well, placing fourth during the conference.

# $16.6 million

State and local tax revenue generated by Missouri S&T.

# $404 million

S&T's contribution to the Missouri economy during fiscal year 2017, according to a University of Missouri system report released in April.

# $22.6 million

Charitable gifts and pledges S&T received during the fiscal year that ended June 30. This was the second-largest fundraising year in university history.


MISSOURI S&T MAGAZINE

*Missouri S&T Magazine* is written, edited and designed by the staff of the Missouri S&T Marketing and Communications Department and the Miner Alumni Association.

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**DESIGN AND PRODUCTION**
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**STAFF PHOTOGRAPHER**
Sam O'Keefe

**CONTRIBUTORS**
Delia Croessmann Lindsey Dunstedter
Mindy Limback Sarah Martin
Hannah Ramsey Standage
Alan Scher Zagier

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**Send letters to:**
Darlene Ramsay
Miner Alumni Association
1100 N. Pine St.
Rolla, MO 65409-0650
Phone: 800-JO-MINER
Fax: 573-341-4706
Email: **alumni@mst.edu**

**News & features:**
Phone: 573-341-4328
Fax: 573-341-6157
Email: **news@mst.edu**
**magazine.mst.edu**

# Q&A

## Miners just want to have fun

*One chapter of the S&T sesquicentennial history book will focus on pranks and scandals. As part of his research for that chapter, **Larry Gragg**, Curators' Distinguished Teaching Professor emeritus of history and political science, asked you to share your stories. Here are just a couple of them.*

**One Halloween about 1982, some students of Del Day in the MRC (Materials Research Center) decided to honor his role in making specialty glasses in the space shuttle missions.** So **Heidi Rutz**, CerE'85, MS CerE'88, donated her white Honda Civic coupe and the 'crew' set out to convert it to a shuttle craft to fly through Rolla and trick-or-treat (heavy on the treat) at the Days' home. Heidi, **Glenn Whichard**, MS CerE'83, and I fabricated wings and a rudder with white cardboard and 2x4s. The propulsion unit was three metal ash tray cylinders taped together with a $CO_2$ fire extinguisher in one, mounted out the back of the hatch. Top speed was 35 mph before the whole thing became unstable. Still searching for that photo. Never heard from safety about the empty fire extinguisher! Was there even a safety department back then?

**Tom Wetteroth**, CerE'79, MS CerE'83
Chandler, Ariz.

## My freshman year, several of my dorm friends and I had a water balloon fight outside our RA's room.

She only came out to tell us to stop when she heard one explode on her door. Oh yeah, the balloons were water-filled condoms. A year or two later, my roommates and I got really into interior decoration using items found around campus. Some of these items included "wet floor" signs from various buildings, traffic cones with Missouri S&T painted on them and orange construction fence. Prior to graduating, I returned all items except for a hot pink wet floor sign with a mustache painted on it that was taken from the electrical engineering building.

**Becky Robinson**, IST'16
Blue Springs, Mo.

### TWITTER

### STEPH EVZ @STEPHEVZ43

One of the highlights from this weekend: Young woman during the Q&A portion of my talk: "I don't have a question. Just wanted to let you know I want to be an engineer and have just decided to go to @MissouriSandT because of your talk."

**Stephanie Evans**, AE'12, an electrical test engineer at Space Systems Loral in Palo Alto, Calif., and creator of The STEMulus YouTube channel, spoke to a group of high school students in Illinois about making STEM more welcoming. The comment Evans tweeted came during the Q&A portion.

"So heads up, fellow Miners. You've got a new recruit incoming, and I'm confident she's going to continue the Missouri S&T tradition of shaping STEM fields, not just with innovation, but also with inclusion," wrote Evans about the experience. Read her complete essay at **magazine.mst.edu**.

### FACEBOOK

### JEFF SCHRAMM, HIST'92, ASSOCIATE PROFESSOR OF HISTORY AND POLITICAL SCIENCE

My students bought me a hydraulic wood splitter.

Since I arrived here at S&T, I've been the faculty advisor for KMNR, 89.7 FM, the student-run college radio station. The students are kind enough to allow me to do a one-hour radio show most Wednesday mornings 10–11 a.m. As the advisor to a great bunch of students, I do what I always try to do, treat people with kindness, respect and love. I didn't think I was doing anything special. But the students and alumni of KMNR evidently thought otherwise. They organized, unbeknownst to me, a fundraising effort to buy me a gift to show just how much they appreciated my advice over the years. They raised more than enough to purchase this wood splitter! They presented it to me after my radio show last week. For one of a very few moments of my life, I was actually speechless. It's taken me several days to even put my thoughts together here. They composed a nice letter to go along with the splitter. It will soon be framed and on my wall in a place of honor.

As a professor, I teach a great many students, both inside and outside of the classroom. They spend their time here at S&T, then move off into the world and live their lives. We professors may keep in touch with a few, but we never really know how they are doing and if all our time, energy, effort and passion in our teaching and interactions with students makes any real difference. But today I know that, perhaps, just a little, I did. I am honored and humbled beyond words.


# CONGRATULATIONS GRADUATES

During May commencement ceremonies, the man who helped determine the site for the *Apollo 11* moon landing told graduates that an S&T education is second to none.

"The education you received at S&T has prepared you for whatever you encounter in your future professional life," said **Farouk El-Baz**, MS GGph'61, PhD GGph'64. "Until today you required someone to take you by the hand and teach you. But from this day forward, you can begin to teach yourself."

Now director of the Center for Remote Sensing and research professor at Boston University, El-Baz was awarded the Chancellor Medal for his contributions to the university's well-being, growth and development.

During the ceremony, S&T presented the Award of Professional Distinction to:

- **John W. Critchfield**, CE'74
- **Ted Day**, CEO and owner of Mo-Sci Corp. in Rolla
- **James A. Faletti**, EMgt'71, MS EMgt'79
- **Danny Scott**, MetE'70

The award recognizes alumni and friends for professional achievement.

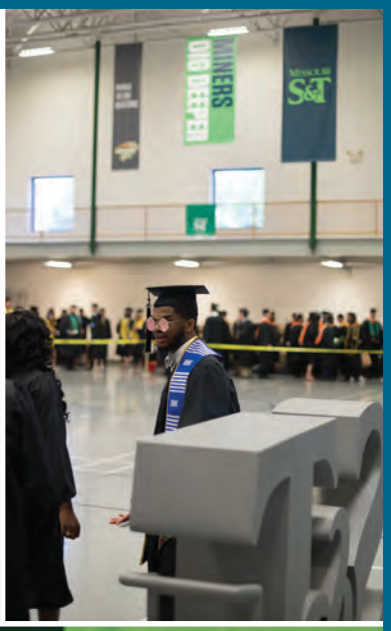
Also during commencement, **Thomas R. Voss**, EE'69, retired president and CEO of Ameren Corp. and executive chairman of Smart Wires, received the doctor of engineering, honoris causa. Voss is a member of the Missouri S&T Board of Trustees, the Engineering and Computing Advisory Board and the Academy of Electrical and Computer Engineering.

> "THE EDUCATION YOU RECEIVED AT S&T HAS PREPARED YOU FOR WHATEVER YOU ENCOUNTER IN YOUR FUTURE PROFESSIONAL LIFE."

In addition, six students addressed their fellow graduates:

- **Sudharshan Anandan**, MS ME'14, PhD ME'18, provided encouragement to his fellow graduates. "If you ever feel afraid or insecure, remember the 'zeroth law of graduate school': Every challenge seems impossible until it is done."
- **Alexander Brooks**, PetE'18, spoke about how S&T prepared him for his future. "Class of 2018, going forward, do not be discouraged and do not be afraid, for the experiences you have had and the people you have met while attending Missouri S&T have given you the strength to carry the pressures that come in the real world."
- **Bolthe Masedi**, Econ'18, MinE'18, shared her story of getting to S&T from Botswana. "We all have a reason for coming this far," she said. "Remember it when life tries to bring you down. Failing makes you stronger, and success is mental. What you envision might not always be what you get, but that could be a blessing in disguise. Just look for the silver lining, it's always there!"
- **Alyssa McCarthy**, Bus'18, told graduates about how S&T brought her out of her shell. "I have had the opportunity over the past five years to work with faculty who pushed me to meet my potential and staff members who have truly changed my life," she said.
- **Rahul Menon**, MS PetE'18, spoke of gratitude and the culture of giving back. "The culture of giving back is something that is encouraged and celebrated here at S&T," he said. "Let that trait always be with you as you embark on your journey to success … because we are a blessed lot to be standing here with our heads held high holding a degree from an amazing institution."
- **Lacey Raper**, BSci'18, talked about what she learned from her mentors. "They've taught me that no matter where I go, to always look to those around me, because success will never be achieved alone."

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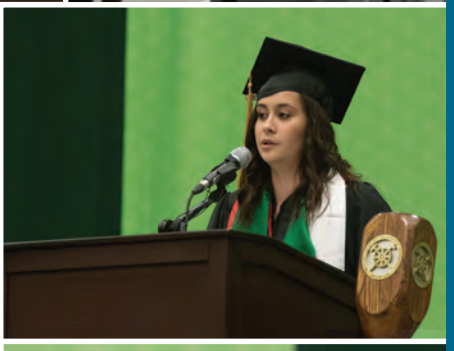

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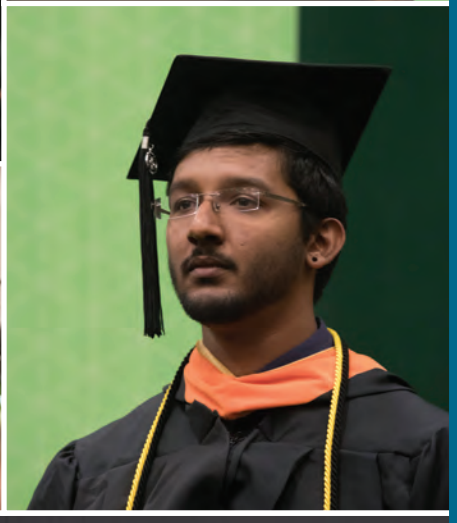


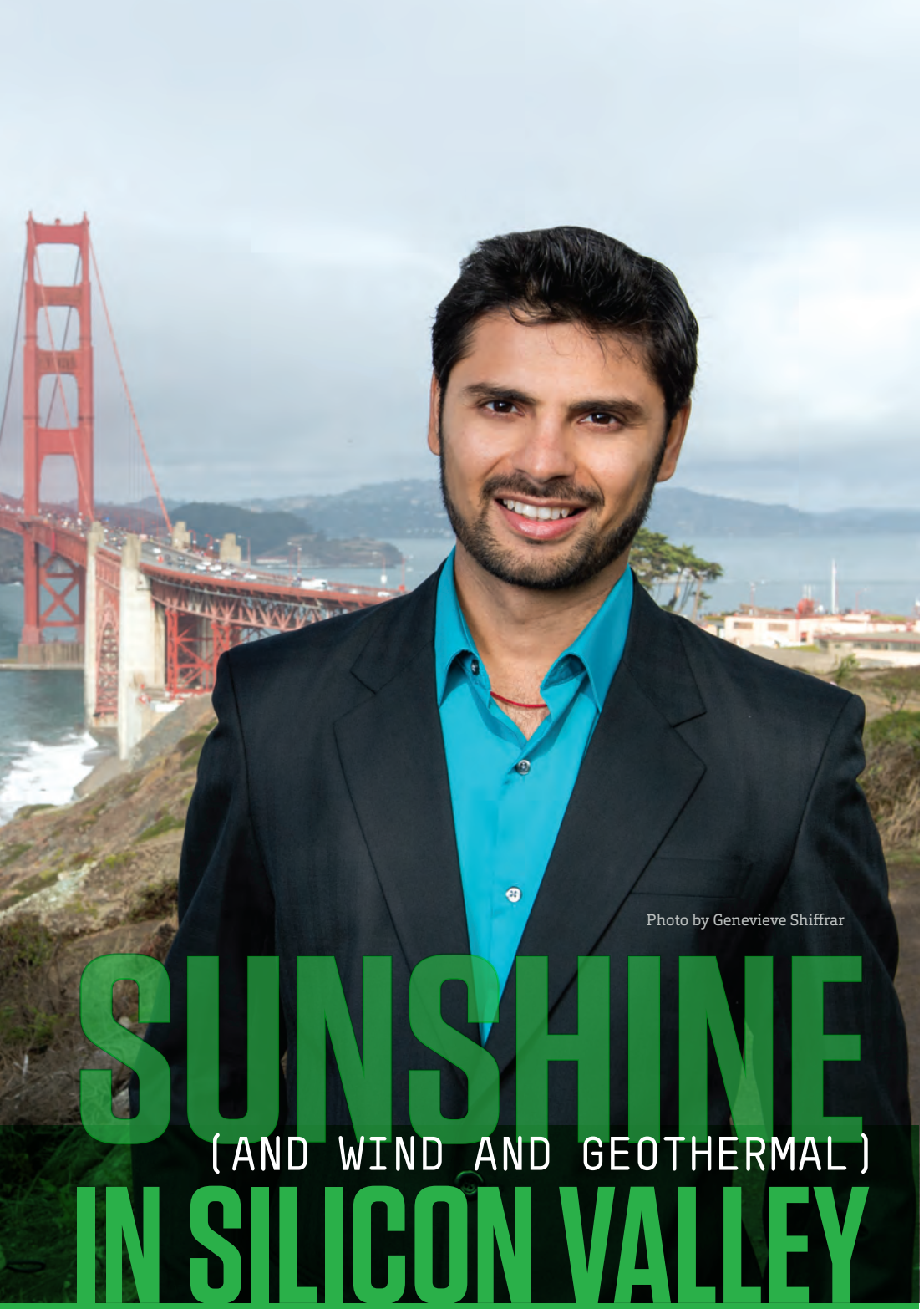



Photo by Genevieve Shiffrar

# SUNSHINE (AND WIND AND GEOTHERMAL) IN SILICON VALLEY

At Missouri S&T, **Jay Modi**, MBA'10, combined his interest in business and enterprise resource planning to become one of the university's first MBA graduates.

Today he is director of finance and administration at Peninsula Clean Energy, a start-up company that gives its customers in San Mateo County, Calif., the option of having one-half to all of their electricity supplied from renewable resources.

Modi does everything from setting up methods to strengthen internal controls to identifying tools to improve staff efficiency and forecasting a five-year financial plan that considers price volatility.

## "...THE BEST REWARD IS I LOVE WHAT I DO."

"I have a very supportive team who is always willing to assist," Modi says. "My manager gives me the opportunity to work on exciting projects, and the best reward is I love what I do."

When Modi was looking at universities to pursue an MBA, he knew he wanted to focus on enterprise resource planning — software packages that coordinate a company's entire operation — and saw Missouri S&T as a natural fit.

"Business and enterprise resource planning, or ERP, is a perfect match for candidates with a bachelor's degree in finance and accounting," Modi says. "That's because at least 90 percent of the job openings in accounting and finance require a candidate to have knowledge of an ERP system. And if you can attest that your MBA major was in enterprise resource planning, it gives you an extra point in the selection process over other candidates."

Modi began his career as a fund accountant at Fotowatio Renewable Ventures in San Francisco. While there, he implemented SAP as its accounting system. It was his first ERP implementation since taking SAP courses at S&T.

"I can proudly say that implementing SAP was one of the best projects of my career," he says.

Modi helped implement Oracle EBS across SunEdison's global business units in 2012 before implementing Intacct System for ForeFront Power, a spin-off of SunEdison's North America division.

"I am thankful to Missouri S&T for offering a great MBA program," he says. "I was not only able to get my first job, but also apply the key business and technical skills on the job."

# GENEROUS PARTNERS
# COMPLETE ACML FUNDRAISING

## Thanks to an investment from the University of Missouri System, major gifts from industry partners and alumni support, S&T will break ground on the Advanced Construction and Materials Laboratory (ACML) on Oct. 12, during Homecoming weekend.

The lab will provide space for research on construction products and processes designed to be stronger, more secure and sustainable.

In June 2017, UM System President Mun Y. Choi committed $1.6 million to the project, identifying it as a strategic investment for the system.

This past February, ARCO Construction Co., its founders and many of the 25 S&T graduates employed there made a $300,000 contribution.

"ARCO stepped up because Missouri S&T — and the S&T alumni who work at ARCO — have been a large part of our success," says **Dick Arnoldy**, CE'69, MS EMgt'73, retired chairman of the general contracting company, which he co-founded in 1992 with **Jeff Cook**, EMgt'94, president and chief executive officer.

In April, Clayco Inc. donated $2 million, completing fundraising for the lab. The company employs about 35 S&T alumni, including chief operating officer and shareholder **Steve Sieckhaus**, CE'87, MS EMgt'94, and executive vice president and shareholder **Tom Sieckhaus**, CE'88.

"Research on next-generation construction materials and methods will have a significant impact on how we design and build in the future," says Steve Sieckhaus. "Investing in this research is a strategic move that will benefit the entire industry."

A U.S. Department of Transportation grant for $2.5 million in testing equipment, obtained by **Kamal Khayat**, the Vernon and Maralee Jones Professor of Civil Engineering, completed the first phase of the initiative. The second phase added faculty positions. The $6.5 million ACML will add 16,000 square feet to the high-bay structures lab in Butler-Carlton Hall.

The Sunderland Foundation, the charitable arm of Ash Grove Cement Co., was also a major donor. Additional support from S&T's College of Engineering and Computing and private gifts including a bequest from **James A. Heidman**, CE'65, MS CE'66, were instrumental to funding the lab.

For Tom Sieckhaus, the partnership is a long-term investment in a better future. "The impact of this research will affect the daily lives of millions for generations to come," he says.

Top: Clayco Inc.'s corporate gift completed fundraising for the lab. Senior management executives Steve Sieckhaus (second row center) and Tom Sieckhaus (third row, top right) are seen with some of the company's employees who hold S&T degrees.

Bottom: ARCO Construction Co. founders and partners stepped up to support the lab expansion. Company founders Jeff Cook and Dick Arnoldy (front row, center) gather here with ARCO partners and fellow Miners.


## BARBARA HALE RETIRES

After 46 years of teaching and research, physics professor **Barbara Hale** has retired.

She was one of the first two women in the physics department when she joined the S&T faculty as an assistant professor in 1973.

Hale has served as faculty advisor for the Eta Kappa chapter of Chi Omega since 1979. In 2014, she received the fraternity's lifetime service award. She was named S&T Woman of the Year in 2013.

## IN PRINT

*My dear Miss Ransom: Letters between Caroline Ransom Williams and James Henry Breasted, 1898–1935* by **Kathleen Sheppard**, associate professor of history and political science, was published in March by Archaeopress Publishing Ltd.

*Songs of Brotherhood in Sons of Anarchy*, published by McFarland Press in March, contains a chapter by **Jossalyn Larson**, assistant teaching professor of English and technical communication, titled "Motorcycle Monasticism: Masculine Religiosity in MC Culture."


## A WISH COME TRUE

Fifteen-year-old Zackrie's dream to visit Atlantis Paradise Island, a resort in the Bahamas, came true when the S&T athletics department and Chi Omega fraternity helped Make-A-Wish Missouri grant his wish. Zackrie has a condition that led to kidney failure and a recent kidney transplant. Make-A-Wish Foundation is the official charity of NCAA Division II and its national Student-Athlete Advisory Committee, and is Chi Omega's national philanthropy of choice. He is seen here giving a fist-bump to Rolla Mayor Lou Magdits during the Make-A-Wish reveal on campus in March.

## ALUMNI HELP WITH SESQUICENTENNIAL PLANNING

Seven alumni, including three Miner Alumni Association board members, have been named to Missouri S&T's sesquicentennial advisory committee. The group is made up of graduates, students, faculty, staff and community members who are involved in planning the university's upcoming 150th anniversary celebration.

Missouri S&T will celebrate its sesquicentennial — or 150th anniversary — during the 2020–21 academic year. Plans call for a kickoff event during Homecoming 2020 as well as a commemorative, coffee table-style history book, a complementary website and video, and other special events.

Alumni serving on the committee are:

- **Genevieve Sutton Bodnar**, MetE'98, MinE'01, of Bunker, Mo., who is employed by Doe Run Co.
- **Lister Florence**, CE'95, MS IST'06, CSci'07, of Rolla, a member of the Chancellor's Advisory Committee on African-American Recruitment and Retention and the S&T Board of Trustees, who is employed by the U.S. Geological Survey.
- **Rachel Grodsky**, CerE'06, of Raymore, Mo., an engineer with Honeywell FM&T in Kansas City.
- **Rachel Jung**, MBA'09 of Rolla, an employee of Brewer Science and member of the MAA board of directors and the College of Arts, Sciences, and Business Dean's Leadership Council executive committee.
- **Daniel Ryan**, ME'12, of Memphis, education officer for Pi Kappa Alpha Fraternity, chair of the New Alumni Council and a member of the MAA board of directors.
- **Mary Helen Stoltz**, Engl'95, of Rolla, editorial director in S&T's marketing and communications department who serves as news and features editor of *Missouri S&T Magazine*.
- **Keith Wedge**, GGph'70, MS GGph'71, PhD GGph'73, of Rolla, a retired Army brigadier general and MAA treasurer.


# A LEGACY IN MINING

## For the Rychtarczyks, engineering is a family affair spanning centuries and oceans.

**Eli Rychtarczyk**, a junior in mining engineering, credits his love of nature, large machinery and exploration for his decision to pursue a degree in mining engineering. But his family history nudged him toward the salt mines.

Rychtarczyk's father immigrated to the United States from Maniowy, Poland, at age 7. The small farming town and surrounding coal mining communities were flooded to expand a local reservoir, and the residents had to relocate.

"Many families moved to Chicago, which is where my dad ended up," says Rychtarczyk. "There is still a large Polish population in Chicago, and they have a yearly celebration downtown to gather the families who used to farm or work in the coal mines."

This past spring, Rychtarczyk held a co-op job at Cargill Deicing Technology in Cleveland, Ohio, where Cargill mines and manufactures salt for food, water purification and roads.

For someone who grew up in the small town of Plainfield, Ind., the sheer size of the Cargill facilities, equipment and salt mine was awe-inspiring.

"The first time I went underground beneath the Great Lakes, I was 1,800 feet from the surface, and I never wanted to leave," says Rychtarczyk. "One of my first major projects at the co-op was to figure out how to renovate and replace a service cage that goes up and down the shaft at 500 feet per minute."

Salt corrodes metal, which is a problem in salt mines where corrosion affects mining equipment. Corrosion repair is costly and can disrupt operations.

"It was my responsibility to figure out how to get this massive unit modified. It was a big engineering problem getting the new prefab service cage into the shaft itself," says Rychtarczyk, who draws inspiration from his family's history and wants to contribute to its mining legacy.

"Polish mines are regarded for their beauty — some are even tourist attractions — but they are not the safest, and they are not efficient," says Rychtarczyk. "My goal is to become well-versed in salt mining — underground and the surface components — so I can help improve the safety of the workers in Polish salt mines while also improving their production.

"This is my way of giving back."

Female freshmen and sophomores in high school experience college life and learn more about career options in engineering, math and science during the university's Summer Solutions for Girls camp. Photo by Aimee Whitmire

# BREAKING BIAS

According to **Jessica Cundiff**, assistant professor of psychological science at S&T, women who consider careers in the physical sciences, technology, engineering and math (STEM) fields are deterred by stereotypes that impose barriers on the recruitment, retention and advancement of women in STEM.

With women making up less than 25 percent of the STEM work force, there has been less progress over the years in STEM than for women working in other historically male-dominated fields such as business, law, medicine, and other areas of science such as biology and psychology.

It may seem that women are freely choosing to opt out of math-intensive STEM careers, but Cundiff says these choices are affected by implicit STEM-male stereotypes that may have been unconsciously ingrained since childhood.

Cundiff examines why these stereotypes exist and recommends ways to remove them in "Subtle Barriers and Bias in STEM: How Stereotypes Constrain Women's STEM Participation and Career Progress," her chapter in the February 2018 book *The War on Women in the United States: Beliefs, Tactics and the Best Defenses*. The book is a collection of 12 scholarly articles that examine gender roles and inequity and the impact of unintentional and purposeful efforts to undermine women's equality in the U.S.

> "EVEN WHEN BIAS IS UNCONSCIOUS, THAT DOES NOT ABSOLVE US OF RESPONSIBILITY."

Cundiff says educators and practitioners can help break these stereotypes and broaden the appeal of STEM by using diverse images to represent the fields and by adapting course projects to include communal goals, which are important to women.

"Even when bias is unconscious, that does not absolve us of responsibility," Cundiff says. "We have a responsibility to interrupt unconscious bias and minimize its effects on our behavior."

# RECORD 31 ATHLETES EARN GLVC HONORS

Thirty-one Missouri S&T student-athletes recorded a 4.0 grade point average during the 2017–18 academic year — the highest number recorded in a single year in S&T history.

Each student-athlete with a 4.0 received the Brother James Gaffney, FSC, Distinguished Scholar Award from the Great Lakes Valley Conference.

A total of 287 student-athletes from across the 15 full-time institutions and six associate members were honored for finishing the year with a 4.0 in the classroom.

# NEW CYBERSECURITY MINOR, CERTIFICATES

Data breaches at big-name businesses have become headline news in recent years. To help build the growing field of cybersecurity — a field with a shortage of experts — S&T now offers a minor in cybersecurity and information assurance for bachelor's students in business and management systems and information science and technology.

The minor requires 15 hours of coursework, covering current information management approaches to application and software security, data networks, mobile technology, digital commerce, privacy laws and the human elements involved. The graduate certificate requires 12 hours of coursework on similar topics.

S&T also offers a graduate certificate in cybersecurity for its MBA program and its master's degree program in information science and technology.

Missouri S&T is accredited by the U.S. National Security Agency and Department of Homeland Security as a Center of Academic Excellence in Information Assurance and Cyber-Defense Research.


## A NEW LOOK FOR MINER ATHLETICS

This fall, Miner athletics fans will begin to see a refreshed visual identity as S&T's 17 varsity teams transition to an updated set of design elements. They include an updated athletic logo, typography and spirit marks like those pictured above, displayed by student-athletes at a campus reveal.

The new look will be rolled out in stages and will be transitioned to every team over time. The new Gibson Arena, which is set to be completed in August, will feature the new design elements. Gibson Arena is named in honor of **Kristie (Capps) Gibson**, EMgt'74, and **John Gibson**, EMgt'74, whose recent $1 million gift to S&T athletics supported major renovations to the arena in the university's Gale Bullman Building. Read more on page 48.

# HELP US TELL THE STORY OF ROLLA'S CONTRIBUTION IN OUR NATION'S CONFLICTS

**A new history of MSM/UMR/S&T will be a part of the upcoming 150th anniversary of the campus, and a chapter in the book will focus on "Miners at War," covering Miners' contributions in World Wars I and II, Korea, Vietnam and the Middle East wars.**

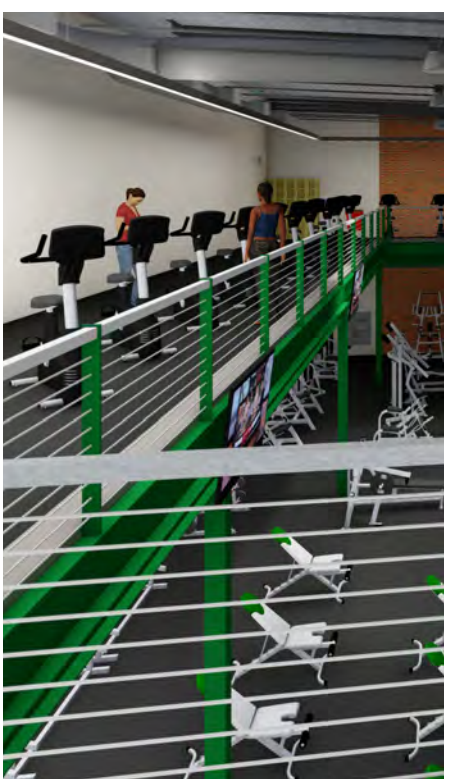
If you are a veteran of any of those conflicts, please email **150@mst.edu** and include your year of graduation, years of military service, the military branch and unit(s) with which you served, and where you served in World War II, Korea, Vietnam or the Middle East. One of the authors will contact you for more information.


# S&T DIGS INTO FITNESS CENTER EXPANSION

Work is underway on a 10,200-square-foot expansion of S&T's fitness center in the Gale Bullman Building.

The expansion will more than double the number of exercise machines and will include a multipurpose exercise room as well as new equipment flooring, wall coverings, sound system and a more efficient single entrance point. The center will also house more weight training equipment on the main level and additional cardio equipment on the expanded mezzanine level.

In 2015, students told Student Council leaders their No. 1 priority was updating the fitness center, and in 2016, they voted to direct a portion of their student recreation fee to make the expansion a reality. Student leaders and university officials broke ground in April. The project is expected to open in April 2019.



Top: The fitness center expansion project includes a new entrance and a glass exterior wall in the fitness area.

Middle: The number of fitness machines will double with the expansion.

Bottom left: Breaking ground are past student council president **Scottie Thomas**, ChE'18, incoming student council president **Madison Moore**, a senior in architectural engineering, and **Kaeden Kessinger**, a senior in engineering management and student council vice president of external affairs.

Bottom right: Additional cardio equipment will be added on the mezzanine level.

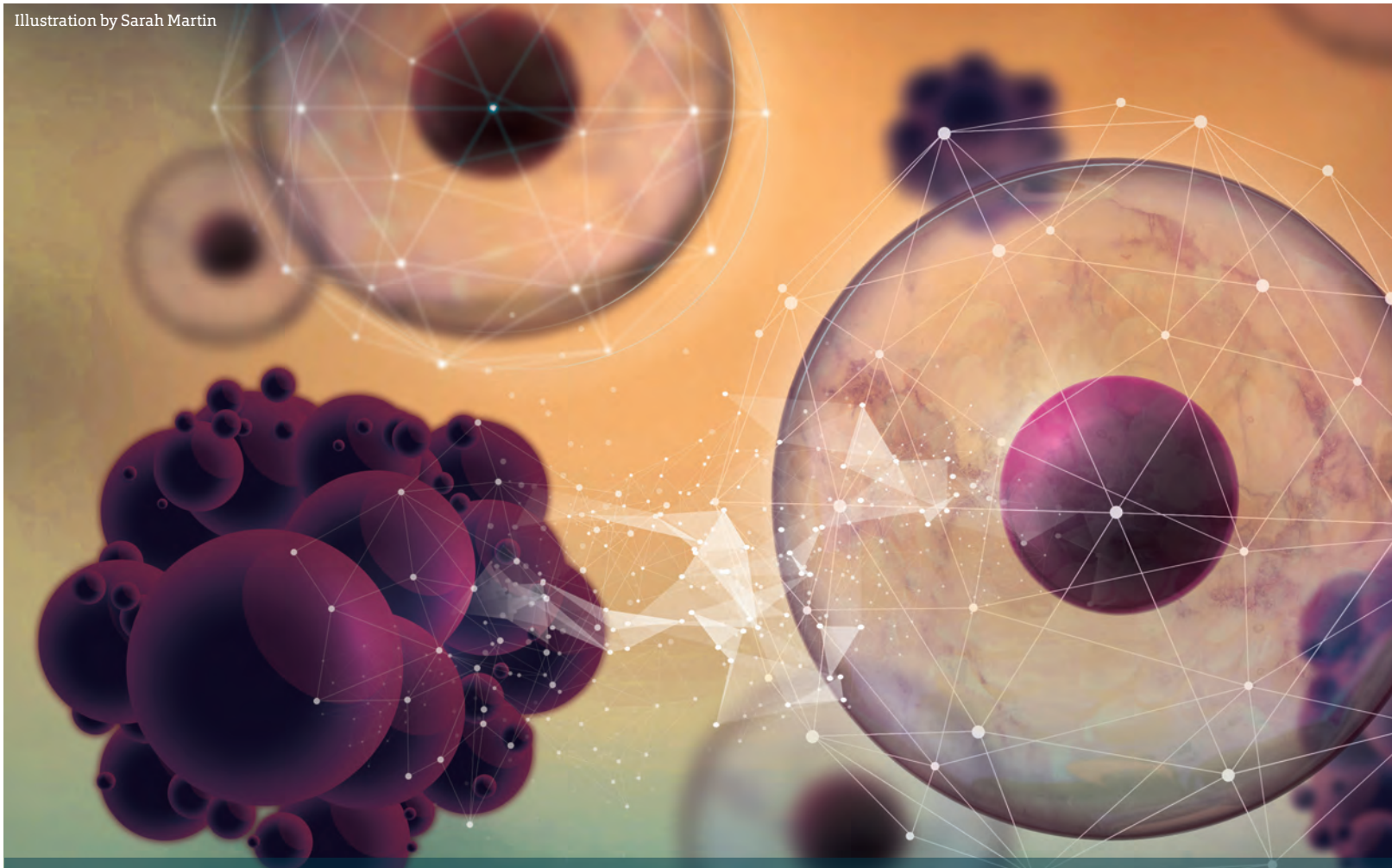


Illustration by Sarah Martin

# ‘CLOAK OF INVISIBILITY’ SNEAKS DRUGS INTO CANCER CELLS

Doxorubicin, or DOX, is one of the most effective and widely used drugs in chemotherapy, but its current delivery mode presents challenges like drug resistance by cancer cells, lack of selective delivery to the right cells and adverse side effects.

In a recent study, a group of S&T researchers led by **Risheng Wang**, assistant professor of chemistry at S&T, found that changing the shape of the DNA nanostructures that deliver the drug could improve its effectiveness.

“Shapes matter,” says Wang. “The optimization of the shape and size of self-assembled DNA nanostructures loaded with anti-cancer drugs may allow them to carry a greater quantity of the drugs, rendering them more effective.”

Wang and her team developed a new cancer drug delivery carrier from non-toxic DNA nanostructures that predicts therapeutic improvements.

“These self-assembled DNA nanostructures could serve as a ‘cloak of invisibility’ to sneak drugs into cancer cells without being detected and pumped out by cells that have already created drug resistance,” Wang says. “Compared with synthetic materials for drug delivery, DNA nanostructures are biodegradable and biocompatible, and their size, shape and rigidity can be easily manipulated, which are the features nanocarriers need.”

To test their self-assembled DNA origami, the researchers used long-term single-cell imaging, an advanced technique that shows molecular interaction, and observed the efficiency of drug delivery in breast cancer cells over a 72-hour period.

“Our results clearly show that efficient drug delivery depends on the shape of DNA nanostructures,” Wang says, “and a rigid 3-D DNA origami triangle transported more DOX in the breast cancer cell nuclei compared to the flexible 2-D DNA structures.”

Wang’s study could also lead to safer bio-tools to diagnose and treat disease.

“With proper modification, this system may also be suitable for delivery of non-drug systems, such as bioprobes for imaging and small interfering RNA (siRNA) molecules for gene therapy,” Wang says.

# CAN AI BE TRUSTED?

Illustration by Sarah Martin

## The reliability of self-driving cars and other forms of artificial intelligence is one of several factors that affect humans' trust in AI, machine learning and other technological advances.

Incidents like the fatal crash of a self-driving Uber that killed a Tempe, Ariz., woman and the death of a test driver of a semi-autonomous vehicle being developed by Tesla put our trust in AI to the test.

"Trust is the cornerstone of humanity's relationship with artificial intelligence," write **Keng Siau**, professor and chair of business and information technology, and **Weiyu Wang**, a graduate student in information science and technology, in a research article in the February 2018 *Cutter Business Technology Journal*. "Like any type of trust, trust in AI takes time to build, seconds to break and forever to repair once it is broken."

The Uber and Tesla incidents indicate a need to rethink the way such AI applications are developed, and for their designers and manufacturers to take certain steps to build greater trust in their products, Siau says.

Despite these recent incidents, he sees a strong future for AI, but one fraught with trust issues that must be resolved.

> "TRUST IS THE CORNERSTONE OF HUMANITY'S RELATIONSHIP WITH ARTIFICIAL INTELLIGENCE."

Siau and Wang point to five areas that can help build initial trust in artificial intelligence systems:

- **Representation.** The more "human" a technology is, the more likely humans are to trust it. "That is why humanoid robots are so popular," Siau says, adding that it is easier to "establish an emotional connection" with a robot that looks and acts more like a human or a robotic dog that acts more like a canine.
- **Image or perception.** Science fiction books and movies have given AI a bad image, Siau says. People tend to think of AI in dystopian terms, as colored by *Terminator* or *Blade Runner* movies or Isaac Asimov and Philip K. Dick novels. "This image and perception will affect people's initial trust in AI," Siau and Wang write.
- **Reviews from other users.** People tend to rely on online product reviews, and "a positive review leads to greater initial trust."
- **Transparency and "explainability."** "To trust AI applications, we need to understand how they are programmed and what function will be performed in certain conditions," Siau says.
- **Trialability.** The ability to test a new AI application before being asked to adapt it leads to greater acceptance, Siau says.

But after they develop a sense of trust, AI creators also must work to maintain that trust. Siau and Wang offer suggestions for developing continuous trust. They include:

- **Usability and reliability.** AI "should be designed to operate easily and intuitively," Siau and Wang write. "There should be no unexpected downtime or crashes."
- **Collaboration and communication.** Developers must focus on creating AI applications that smoothly and easily collaborate and communicate with humans.
- **Sociability and bonding.** Building social activities into AI applications, like a robotic dog that can recognize its owner and show affection, is one way to strengthen trust.
- **Security and privacy protection.** AI applications rely on large data sets, so ensuring privacy and security will be crucial to establishing trust in the applications.

Already, Siau is working to prepare MBA students at Missouri S&T for the AI age through Artificial Intelligence, Robotics, and Information Systems Management, a course he introduced in 2017. As part of the coursework, Siau asks each student to present an article on a new artificial intelligence or machine learning technology or application. ◘

# NANODIAMONDS

## ARE THIS RESEARCHER'S BEST FRIEND

Recent chemistry graduate **Cholaphan Deeleepojananan**, Chem'18, studies microscopic bling known as nanodiamonds — carbon-based particles that are about 5-billionths of a meter — because she says their potential future applications are unlimited.

Chemically stable and nontoxic, nanodiamonds' applications range from abrasives and polishing materials to oil additives and sunscreen components. They can even be used for targeted drug delivery in cancer treatment.

As an undergraduate researcher, Deeleepojananan studied a method that uses salt to break apart nanodiamond aggregates into single-digit stable particles. The method is easier and less expensive than conventional methods. But more importantly, it produces nanodiamonds with no toxic or hard-to-remove impurities, which makes them well suited for "theranostics" — precise drug delivery that combines diagnostic and therapeutic applications in a single platform.

Her work has been published in the journal *ACS Applied Materials & Interfaces* and the journal *ACS Nano*. She worked with **Vadym Mochalin** (pictured above with Deeleepojananan), associate professor of chemistry at S&T.

## S&T COLLABORATES WITH MU, UMKC ON DRONE RESEARCH

Missouri S&T's expertise in electrical and computer engineering will play a role in a new $7.2 million grant and a $7.7 million contract from the U.S. Department of Defense's Office of Naval Research to reduce national security threats from drones. The project is led by the University of Missouri-Kansas City and includes researchers from the University of Missouri-Columbia.

Unmanned aerial vehicles (UAVs) are commercially available to the public and present an increasing threat to national security that ranges from intelligence gathering to delivery of a weaponized payload. They could also unintentionally create havoc by becoming caught in the air intake of a jet engine.

The threat from drones, whether intentional or unintentional, is disproportionate in cost and complexity compared to the damage they can cause. The four-year grant award will focus on advancing high-power microwave electronic countermeasure technologies.

The research team includes S&T electromagnetic compatibility experts **Daryl Beetner**, professor and chair of electrical and computer engineering, and **Victor Kilkevich**, a research associate professor affiliated with Missouri S&T's Electromagnetic Compatibility Laboratory.

# STUDYING THE HUMAN SIDE OF MEDICINE

Recent studies suggest that the more medical students were exposed to courses in the humanities, the more likely they were to possess empathy, wisdom and emotional intelligence. Because scientists and humanists often learn and work differently, the field of biomedical humanities examines the human side of healthcare through disciplines like literature, history and philosophy.

This past spring, two new research centers, the Center for Science, Technology and Society (CSTS) and the Center for Biomedical Research (CBR), co-presented the first Biomedical Humanities Symposium at S&T.

"Through this holistic approach, students, health professionals and other researchers consider how to use ethical judgment, compassionate communication and sound decision-making along with their scientific expertise," says **Kate Drowne**, CSTS director, associate dean of academic affairs for the College of Arts, Sciences, and Business, and a professor of English.

The CSTS was formed in 2018 to give S&T humanists, scientists and engineers a chance to collaborate on research that addresses how science and technology shape, and are shaped by, our society, culture, politics and the environment.

The CBR is a multidisciplinary research center with a mission to research and develop advanced biomaterials, devices and therapeutics for applications in the biomedical industry. Its research focuses on biomedical engineering.

# BOGAN SOLVES BENTON MURAL MYSTERY

Missouri State Capitol muralist Thomas Hart Benton wrote in his memoir about being called into then-Gov. Guy Park's office and told that a prominent St. Louis politician objected to Benton's portrayal of black people, especially depictions of slavery.

Benton didn't want to erase that piece of Missouri history from the Capitol mural, so instead, Benton invited the man described as the "most important black voter 'getouter' in the city" to model for a figure, leaning on a tree at a distance.

That figure — and the man who inspired it — had long been a mystery.

**James J. Bogan Jr.**, Curators' Distinguished Teaching Professor emeritus of art history and film, believes he has solved that mystery.

Bogan spent the last couple of years combing through historical photos and archives to solve the mystery of the man's identity. An inquiry to the *St. Louis Post-Dispatch* yielded an obituary of Jordan Chambers, who fit the profile of Benton's description of the man.

"Getting the obituary on Jordan Chambers is what convinced me that this was the guy," says Bogan. "The obituary calls him the 'Negro mayor of St. Louis,' and candidates at all levels of government wanted his support. Also, he was noted for wearing a 'signature' white Stetson hat, just like the fellow in the mural."

The full article of Bogan's research about Benton's encounter with Jordan Chambers and a free download of Bogan's documentary *Tom Benton's Missouri* is available at **rol.la/bentonmural**.

# USING BIG DATA

## TO REDUCE CHILDBIRTH RISKS

According to the Centers for Disease Control and Prevention, complications during pregnancy or childbirth affect more than 50,000 women annually, and about 700 of them die every year. **Steve Corns**, associate professor of engineering management and systems engineering, is working with researchers from Phelps County Regional Medical Center through the Ozarks Biomedical Initiative to reduce that number.

Corns is studying fetal heart rate patterns to develop a computational model that can predict the risk of dangerous conditions like fetal hypoxia and acidosis after a mother is in labor.

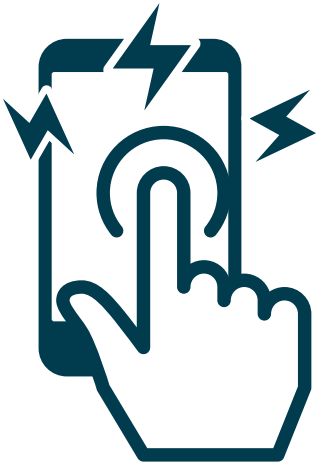
"The goal is to look at the heart rate to try to predict what those conditions are (that cause oxygen deprivation during birth)," Corns says. "And then before we get to the situation where the baby is highly acidotic, go in and do an intervention."

Corns says that in the early stages of labor, doctors typically rely on cardiotocography, also known as electronic fetal monitoring, to record fetal heartbeat and uterine contractions, usually reviewing the results every 10 to 20 minutes.

Corns instead wants to analyze tens of thousands of discrete data points that could more accurately predict patterns — and pitfalls — to arm physicians and nurses with more informed decision-making tools.

Early results are promising. In a research paper presented at the 2017 IEEE International Conference on Computational Intelligence in Bioinformatics and Computational Biology, the researchers found two types of algorithms that demonstrated a 96 percent accuracy rate in predicting outcomes in the three fetal heart rate classifications: normal, indeterminate and abnormal.

The team hopes to compile data representing over 100,000 live births by collaborating with medical scholars in Columbia, St. Louis and Kansas City.



# HARNESSING FRICTIONAL ENERGY

Imagine that every time you tapped out a message on your smartphone it would create electric power instead of sapping your phone's battery. That scenario could one day be a reality, according to **Vadym Mochalin**, associate professor of chemistry at Missouri S&T. His research on MXenes was published in the February 2018 issue of the journal *Nano Energy*.

Discovered in 2011, MXenes make up one of the largest families of two-dimensional materials. And because they have high electrical conductivity and can take up electrons when in contact with polymers and other materials, they could be used to harvest wasted frictional energy — like the energy from muscle contractions while typing or walking.

This unusual combination of properties makes MXenes useful as components for triboelectric nanogenerators (TENG), which turn muscle movements into electric power. The research suggests these advanced materials could be incorporated into mobile phones, handheld electronics, wearable devices and laptops, ultimately making them self-powering. They could also be used in biology, medicine, electronics and water purification.

# S&T TEAM PLACES SECOND IN UNIVERSITY ROVER CHALLENGE, BEST AMONG U.S. TEAMS

Missouri S&T's Mars Rover Design Team, winner of the 2017 University Rover Challenge (URC), finished second among a field of 36 collegiate teams in this year's competition, which was won by Poland's Czestochowa University of Technology. S&T had the top score among the 12 U.S. teams in the competition.

The three-day competition was held May 31–June 2 at the Mars Desert Research Station in Hanksville, Utah. The Utah desert is used for the event because it resembles the rocky terrain of Mars.

S&T's rover, named *Atlas*, is a student-designed and -built rover. The team developed custom circuitry for the vehicle, machined the aluminum and carbon-fiber support structure, developed durable wheels for terrain mobility, and 3-D printed gears used in the rover.

Photo courtesy of Mars Rover Design Team

# WELCOME BACK MINERS

## JOIN YOUR ALUMNI ASSOCIATION AT THESE KEY EVENTS.


### Miner Legends Luncheon

**Friday, noon — Hasselmann Alumni House**
The Miner Alumni Association recognizes accomplished alumni for their achievements and contributions to S&T.

### Advanced Construction and Materials Laboratory Groundbreaking

**Friday, 4 p.m. — Butler-Carlton Civil Engineering Hall**

Join us as we break ground on a new laboratory dedicated to advancing S&T's national leadership in infrastructure engineering.

### Silver and Gold Gathering

**Friday, 5 p.m. — Hasselmann Alumni House**
Come enjoy an evening of fun, friends and food at this laid-back, ticketed event.


### Alumni Association Tailgate Party

**Saturday, 11 a.m. — Gale Bullman Building parking lot**
Come enjoy the sights and sounds (and tastes) of game day and prepare to beat the Cardinals at this ticketed event.

### SUB Homecoming Parade

**Saturday, 11 a.m. — Downtown Rolla**
Flaunt your school spirit while watching the parade, which starts at State Street and passes by Hasselmann Alumni House.

### Football Game

**Saturday, 1 p.m. — Allgood-Bailey Stadium**
Dress in your Homecoming day best and help cheer on your Miners. Grab your friends, and we'll see you in the stands.


### Miner Alumni Social

**Saturday, 6 p.m. — Public House Brewing Co.**
Wrap up your Homecoming weekend with a pint and some down time with fellow alumni. We'll serve complimentary Alex's Pizza.

Register online at **mineralumni.com/homecoming.**

# MinerFest

## Miner Homecoming Fall Festival

Come back to where it all began.

# HOMECOMING SCHEDULE

## THURSDAY, OCT. 11

**Academy of Mechanical and Aerospace Engineers Board of Directors Meeting**
12:30 p.m. | Silver and Gold Room, Havener Center

**Geology and Geophysics Advisory Board Meeting**
2–3 p.m. | Room 124, McNutt Hall

**Academy of Engineering Management/EMSE Student Meeting**
3–4:30 p.m. | Engineering Management Building

**Academy of Engineering Management Faculty Mixer**
4:45–6 p.m. | 2nd Floor Atrium, Engineering Management Building

**Academy of Mechanical and Aerospace Engineers Induction Dinner and Program**
5 p.m. Social, 6:30 p.m. Dinner and Program | St. Pat's Ballroom, Havener Center

**Academy of Computer Science Banquet**
6 p.m. | Matt's Steakhouse, 12200 Dillon Outer Road, Rolla, Mo.

**Jackling Jocks Welcome Pizza Party**
6 p.m. | Comfort Suites, 1650 Old Wire Outer Road, Rolla, Mo.

**Geology and Geophysics Annual Awards and Alumni Banquet**
6–8:30 p.m. | Carver-Turner Room, Havener Center

**Academy of Engineering Management Banquet**
6:30–8:30 p.m. | Location TBD

## FRIDAY, OCT. 12

**Academy of Mines and Metallurgy Homecoming Meeting**
8 a.m.–3:30 p.m. | Missouri-Ozark Room, Havener Center

**Academy of Engineering Management Meeting and Lunch**
8:30 a.m.–1 p.m. | Location TBD

**Academy of Computer Science Meeting**
8:45 a.m.–2 p.m. | Room 327, Computer Science Building

**Miner Alumni Association Committee Meetings**
9 a.m.–4 p.m. | Hasselmann Alumni House

**Academy of Mechanical and Aerospace Engineers Annual Business Meeting**
9 a.m. | Missouri-Ozark Room, Havener Center

**Homecoming Registration**
10 a.m.–6 p.m. | Hasselmann Alumni House

**Order of the Golden Shillelagh Executive Committee Meeting**
10–11 a.m. | Development Conference Room G21, Hasselmann Alumni House

**Jackling Jocks Lunch**
11 a.m. | Sybill's St. James, 1100 N. Jefferson St., St. James, Mo.

**Miner Legends Luncheon**
Noon–1:30 p.m. | Kinyon-Koeppel Grand Hall, Hasselmann Alumni House

Help us honor some of our most distinguished alumni as they receive Miner Alumni Association awards.

*Tickets for event: $20 each, complimentary for MAA board members and S&T academy members.*

**Academy of Mechanical and Aerospace Engineers Student Design Team Presentations**
1:45 p.m. | Room 140, Toomey Hall

**Department Open Houses**
3–4 p.m. | various campus locations

- Biological sciences
- Business and information technology
- Chemical and biochemical engineering
- Civil, architectural and environmental engineering
- Economics
- Electrical and computer engineering
- Engineering management and systems engineering
- Geology and geophysics
- Materials science and engineering
- Mechanical and aerospace engineering
- Mining and nuclear engineering
- Physics

**Advanced Construction and Materials Laboratory Groundbreaking**
4–5 p.m. | Butler-Carlton Civil Engineering Hall

**Silver and Gold Gathering**
5 p.m. Reception, 6–8 p.m. Dinner Buffet
Hasselmann Alumni House

*Tickets for event: $25 for adults, $10 for children ages 6-12, free for children age 5 and under.*

**Jackling Jocks Dinner at the Silver and Gold Gathering**
5 p.m. | Hasselmann Alumni House

**Academy of Miner Athletics Dinner at the Silver and Gold Gathering**
5–7 p.m. | Hasselmann Alumni House

**Academy of Miner Athletics New Member Induction Ceremony**
7:15 p.m. | Carver-Turner Room, Havener Center

# SATURDAY, OCT. 13

**Miner Alumni Association Board of Directors Meeting**
8–11 a.m. | Kinyon-Koeppel Grand Hall, Hasselmann Alumni House

The association's annual meeting will be held in conjunction with this event.

**Academy of Miner Athletics Annual Membership Meeting**
8:30 a.m. | Room G-26F, Gale Bullman Building

**MinerFest Family Connection**
9:30 a.m. | St. Pat's Ballroom, Havener Center
Annual parents meeting

**Homecoming Registration**
10:30 a.m.–1 p.m. | Alumni Tent, Gale Bullman Building parking lot

**SUB Homecoming Parade**
11 a.m.
Parade follows State Street to 11th Street past Hasselmann Alumni House.

**Miner Alumni Association Tailgate Party**
11 a.m.–1 p.m. | Alumni Tent, Gale Bullman Building parking lot

Join us for an authentic tailgate party with beverages and other tailgate goodies.

*Tickets for event: $5 for those who preregister online or call by Oct. 7, 2018. Tickets purchased at the door: $10 for adults, $5 for children ages 6 to 12, free for children age 5 and under, free for the first 150 registered students.*

**Missouri S&T Athletic Hall of Fame Room open to visitors**
11:30 a.m.–12:30 p.m. | Room G-25, Gale Bullman Building

**Football Game: Miners vs. William Jewell University**
1 p.m. | Allgood-Bailey Stadium

*Tickets for event: $8 for adults, $5 for students (K-college) and seniors age 65+, free for children age 5 and under or S&T students with a valid ID.*

**Order of the Golden Shillelagh Homecoming Reception**
5:30–6:30 p.m.
John O. Farmer Lounge, Hasselmann Alumni House

**Miner Alumni Social**
6–8 p.m. | Public House Brewing Co., 600 N. Rolla St.

Wrap up your homecoming weekend with a pint and some down time with fellow alumni. We'll serve complimentary Alex's Pizza. Come and go as you please.

**Jackling Jocks Annual Banquet and Business Meeting**
6–9 p.m. | Carver-Turner Room, Havener Center

# SUNDAY, OCT. 14

**Chancellor's Advisory Committee on African-American Recruitment and Retention Meeting**
11 a.m.–2 p.m. | Hasselmann Alumni House

# SPECIAL CELEBRATIONS

**Jackling Jocks 21st Annual Reunion**
Oct. 11–13
For more information contact **Delbert Day**: 573-364-5569, **day@mst.edu** or **Newton Wells**: 979-690-3650, **nwells1@suddenlink.net**

**Advanced Construction and Materials Laboratory Groundbreaking**
4–5 p.m. Friday, Oct. 12, Butler-Carlton Civil Engineering Hall

**Order of the Golden Shillelagh Homecoming Reception**
5:30–6:30 p.m. Saturday, Oct. 13, John O. Farmer Alumni Lounge, Hasselmann Alumni House

# MINERFEST REGISTRATION INFORMATION

Register online at **mineralumni.com/homecoming** or call 800-JOMINER (800-566-4637).

Alumni should pick up their registration packets at the Homecoming Welcome Table:

10 a.m.–6 p.m. Friday, Oct. 12, Hasselmann Alumni House

10:30 a.m.–1 p.m. Saturday, Oct. 13, Alumni Tent, Gale Bullman Building parking lot

# ACADEMY EVENTS

## Academy of Computer Science

**Banquet**
6 p.m, Thursday, Oct. 11
Matt's Steakhouse, 12200 Dillon Outer Road, Rolla, Mo.

**Meeting**
8:45 a.m.–2 p.m. Friday, Oct. 12
Room 327, Computer Science Building

## Academy of Engineering Management

**EMSE Student Meeting**
3–4:30 p.m., Thursday, Oct. 11
Engineering Management Building

**Faculty Mixer**
4:45–6 p.m., Thursday, Oct. 11
2nd Floor Atrium, Engineering Management Building

**Banquet**
6:30–8:30 p.m., Thursday, Oct. 11
Location TBD

**Meeting and Lunch**
8:30 a.m.–1 p.m., Friday, Oct. 12
Location TBD

## Academy of Mechanical and Aerospace Engineers

**Board of Directors Meeting**
12:30 p.m. Thursday, Oct. 11
Silver and Gold Room, Havener Center

**Induction Dinner and Program**
5 p.m. Social, 6:30 Dinner, Thursday, Oct. 11
St. Pat's Ballroom, Havener Center

**Annual Business Meeting**
9 a.m. Friday, Oct. 12
Missouri-Ozark Room, Havener Center

**Student Design Team Presentations**
1:45 p.m. Friday, Oct. 12
Room 140, Toomey Hall

## Academy of Miner Athletics

**Dinner at the Silver and Gold Gathering**
5–7 p.m. Friday, Oct. 12
Hasselmann Alumni House

**New Member Induction Ceremony**
7:15 p.m. Friday, Oct. 12
Carver-Turner Room, Havener Center

**Annual Membership Meeting**
8:30 a.m. Saturday, Oct. 13
Room G-26F, Gale Bullman Building

## Academy of Mines and Metallurgy

**Homecoming Meeting**
8 a.m.–3:30 p.m. Friday, Oct. 12
Missouri-Ozark Room, Havener Center

# 2018 HOMECOMING AWARD RECIPIENTS

### Alumni Achievement

1. **David Heikkinen**, ME'93, founding partner and chief executive officer, Heikkinen Energy Advisors
2. **William Tedesco**, GGph'97, vice president, Gulf of Mexico Explorations, Anadarko Petroleum Corp.

### Alumni Merit

3. **Diane Butrus**, CSci'85, chief operating officer, Diba Imports
4. **Larry Gragg**, Curators' Distinguished Teaching Professor emeritus of history and political science, Missouri S&T

### Robert V. Wolf Alumni Service

5. **Dale Morse**, EE'79, engineering group manager, General Motors (retired)

### Distinguished Young Alumni

6. **Karen (Strothkamp) Hogan**, EMgt'02, division manager-special projects, Turner Construction Co.
7. **Traci Walker**, Hist'00, director of digital service procurement, United States Digital Service, Office of Management and Budget, Executive Office of the President

### Frank H. Mackaman Alumni Volunteer Service

8. **Dennis Leitterman**, EE'76, MS EE'77, channel development manager, Hewlett-Packard Co. (retired)

### Class of '42 Excellence in Teaching

9. **Wenqing Hu**, assistant professor of mathematics and statistics

# HONORING NEW ACADEMY MEMBERS

In April, 33 alumni and friends were inducted into Missouri S&T academies. Academy membership recognizes careers of distinction and invites members to share their wisdom, influence and resources with faculty and students. Some academies hold induction ceremonies in the spring, others in the fall.

## ACADEMY OF CHEMICAL ENGINEERS

**David K. Denner**, ChE'76

**Michael Hoerle**, ChE'84

**Thomas Schmitt**, ChE'79

## ACADEMY OF CIVIL ENGINEERS

**Joel Burken**, Curators' Distinguished Professor and chair of civil, architectural and environmental engineering

**Norm Dennis**, CE'71, MS CE'73

**John E. Finke**, CE'89, DE CE'16

**Marsia Geldert-Murphey**, MS CE'97

**Stephanie Hall**, Econ'90, CE'97

**Jeffrey Martin**, CE'96

**Dale Merrell**, CE'67

**Chris Pantelides**, MS CE'83, PhD CE'87

**Brian Satterthwaite**, CE'89

**William Schonberg**, honorary member, professor and former chair of civil, architectural and environmental engineering

**Raymond Webb**, CE'89

**Dale Williams**, CE'72, MS CE'73

## ACADEMY OF ELECTRICAL AND COMPUTER ENGINEERING

**Harry J. Auman**, EE'70

**Arthur E. Curle**, EE'75

**Matt Doell**, EE'85

**Timothy R. Hagan**, EE'83

**Ronald G. Kochanowicz**, EE'94

**Clay Melugin**, EE'84

## ACADEMY OF ENGINEERING MANAGEMENT

**John R. "Jay" Ashcroft**, EMgt'96, MS EMgt'98

**David W. May**, EMgt'82

**Yildirim Omurtag**, former chair and professor emeritus of engineering management and systems engineering

## ACADEMY OF MINES AND METALLURGY

**Laura Schoenbeck Agee**, CerE'02

**David Borrok**, GGph'95, Gulf Oil Foundation Professor and chair of geosciences and geological and petroleum engineering

**Eric Burkhalter**, GeoE'96

**Christopher P. Buterbaugh**, MetE'07

**Bonnie Carson**, GGph'77

**Steven Jung**, CerE'05, MS CerE'07, PhD MSE'10

**James E. Pinkley**, MinE'83

**Rich Szevery**, MetE'02

**John C. Wagner**, NucE'92


BEYOND
EXPLOSIVES ENGINEERING EMBRACES ROOTS —

By Alan Scher Zagier, zagiera@mst.edu

# MINING

## BUT EVOLVES WITH 21ST-CENTURY FOCUS

When mining engineering professor **George Clark** established the Rock Mechanics and Explosives Research Center in 1964, the focus was straightforward: find a better way to blast rocks.

"EXPLOSIVES HAVE ALWAYS BEEN USED IN MINING," SAYS CURRENT MINING ENGINEERING PROFESSOR **PAUL WORSEY.** "YOU CAN'T PICK UP A WHOLE MOUNTAIN AND MOVE IT. WE PUT IN EXPLOSIVES, AND WE BREAK ROCK. WE'VE TAUGHT THAT HERE SINCE 1870."

Fast-forward to 2018, and explosives engineering at Missouri S&T has a decidedly 21st-century focus. Training in rock extraction techniques continues, but students can also study pyrotechnics or enroll in the nation's first Ph.D. program in explosives engineering.

More than 70 S&T students have received first-of-its-kind master of science degrees in the discipline since 2010. Hundreds more have earned undergraduate and graduate certificates in explosives engineering or explosives technology over the past decade, or bolstered their degrees with minors in explosives.

The explosives engineering program — which remains a part of the department of mining and nuclear engineering — also collaborates with nearby Fort Leonard Wood to train explosives ordnance disposal (EOD) technicians, as well as with the federal Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), whose agents clamored for a new master of science in explosives technology aimed at those without an engineering background.

"What we do for a living is far different than mining and demolition," says Bill Joa, chief of the explosives research and development branch at the ATF National Center for Explosives Training and Research in Huntsville, Ala. "There's nowhere else in the country to get this training."

## RESEARCH HEAVYWEIGHT

**Catherine Johnson**, an assistant professor of explosives engineering since 2015, came to Rolla from the University of Kentucky, a pipeline that also delivered colleague and assistant professor **Kyle Perry**.

S&T's unmatched explosives research facilities were a big draw, Johnson says: both the century-old Experimental Mine as well as the freestanding Energetics Research Facility, which opened in 2016 at the rock mechanics complex and includes a blast chamber capable of containing an 8-pound explosives detonator.

"Large chambers are a big deal," she says. "S&T is the only university with an energetics lab with chambers our size."

Johnson's research reach is vast. She's received a Department of Defense grant to study mild traumatic brain injury among soldiers by creating an open-field blast model to mimic battlefield conditions. She oversees a Ph.D. student working to create a nuclear barcode as an identification taggant for explosives; is developing an active barrier system and underground testing facility to prevent coal dust explosions in mines; and is collaborating with a U.S. Navy contractor in Tennessee to develop 3-D printed explosives.

"There are (still) more jobs on the mining side, but the research is more on the military side," she says.

"Our research was always 'mission impossible.' That made us versatile, and things built from there," adds Worsey, a Rolla professor for 37 years who is universally credited as the explosives program's founder. "We do very applied research. It's big-picture stuff that gets attention."

That attention includes a reality TV production team which met Worsey at an annual meeting of the International Society for Explosives Engineers. That meeting paved the way for "The Detonators," a 13-episode Discovery Channel documentary series featuring Worsey and former department chair **Braden Lusk**, MinE'00, PhD MinE'06, that first broadcast in 2009 and continues to air in syndication.

And in July, the S&T explosives program was featured on yet another popular reality TV series: "Ozzy and Jack's World Detour," starring Rock and Roll Hall of Fame member Ozzy Osbourne, best known as the lead singer of Black Sabbath, and his children Jack and Kelly.

## MEETING A NEED

The roots of explosives engineering and explosives technology as standalone disciplines in Rolla date back to the turn of the 21st century, says former mining department chair Larry Grayson. He noticed a precipitous enrollment decline, particularly among graduate students, after returning to campus in 2000 following a stint as associate director of the federal Office for Mine Health Safety and Research in Washington.

"We were quite good at attracting students in general, but we needed something to kick it up a notch," says Grayson, now a retired endowed chair of mining engineering at Penn State.

That led, in short order, to online master's degree programs in mining engineering, the addition of explosives engineering as a formal degree emphasis area and, notably, the start of the instantly popular summer explosives camps for high school students, which quickly became an invaluable recruiting and marketing tool.

Concurrent to that growth, the country's political and regulatory climate following the Sept. 11, 2001, terrorist attacks focused greater attention on and legal oversight of explosives, notes Lusk.

"9/11 changed the way we do business in the explosives industry," he says, citing the 2002 Safe Explosives Act, which requires anyone who handles or transports explosives to have a federal license or permit and further restricts those who can legally do so.

Joa, the ATF supervisor, is among the federal law enforcers who is enrolled in the new graduate degree program in explosives technology.

"Our agents often testify in court as expert witnesses, so this gives us an outside credential," he says. "It's very important, in this day and age, to have an academic credential to support your expertise."

For Lusk, who left S&T in July for a position with commercial explosives manufacturer Dyno Nobel, the new degree program is "another example of us trying to listen" to the needs of the marketplace.

"We heard the need," he says. "So this gives them the opportunity to get specialized training and earn a degree. We have a real growth market there."


"...we needed something to kick it up a notch"

# RECRUITING THE NEXT GENERATION

By Mary Helen Stoltz, mhstoltz@mst.edu

S&T'S LEADERSHIP IN EXPLOSIVES HAS BEEN ACCELERATED BY MANY FACTORS, BUT ONLY ONE IS RAISING THE PROGRAM'S VISIBILITY AMONG A KEY DEMOGRAPHIC: 16-, 17- AND 18-YEAR-OLDS.

"Explosives Camp has singlehandedly attracted many students into mining and explosives engineering — and many students to S&T," says explosives engineering professor **Paul Worsey**, who is widely credited with masterminding an idea many thought was crazy when the camp offered its first session in 2004.

This past June, S&T completed its 32nd session of Explosives Camp.

Worsey says the camp grew out of the Jackling Introduction to Engineering, a summer camp designed to give high school students an idea of what a career in engineering is all about. Some campers returned to campus for a research session with a faculty member.

"Three kids wanted to come back to do mining research," Worsey says, "but most faculty were

gone for the summer. Larry Grayson, our chair at the time, asked me to take them to the mine and show them explosives.

"We did all sorts of things, fun things as well, and at the end of it they were so enthralled, and they said we should offer a whole camp on explosives engineering."

So, they did.

"Our motto has always been 'because we can,'" says Worsey. "We've been ahead of the curve in what they call experiential learning for years."

**Maggie Hettinger**, MinE'10, MS ExpE '15, and **Matt Turner**, MinE'11, can attest to the recruiting power of that motto. They both attended Explosives Camp as high school students and both returned to S&T to earn degrees.

"My camp experience definitely influenced my decision to major in mining engineering," says Hettinger, now a drill and blast engineer for Barrick Gold of North America. "Handling explosives and being that close to the action was exciting."

Turner arrived at camp with an injury that exemplified a classic object lesson in explosives.

"HANDLING EXPLOSIVES AND BEING THAT CLOSE TO THE ACTION WAS EXCITING."

# "BEFORE ATTENDING CAMP, I HAD NO IDEA WHAT I WANTED TO DO FOR A CAREER. AFTER CAMP, I HAD NO DOUBT!"

"I blew out my eardrums the week before camp playing with oxygen-acetylene balloons on our farm," says Turner, a mine engineer for Doe Run, which offered two full scholarships to Explosives Camp this past June. "The importance of safety was stressed during camp and yes, earplugs are definitely a part of safety training. Before attending camp, I had no idea what I wanted to do for a career. After camp, I had no doubt!"

Worsey says Explosives Camp began as a hands-on program and has gotten even more so over the years.

"The whole camp is a smorgasbord of explosives and things that go boom and fizz," Worsey says. "At the end of the week, campers set up a pyrotechnics show for their parents," as the photo above depicts.

"They come in excited about blowing everything up," Worsey says. "But they leave understanding how to do it safely and why it works." ◻

# EXPLODING WITH RESEARCH

By Sarah Potter,
sarah.potter@mst.edu

From the fireworks at a Kansas City Chiefs football game to improved mineral mining practices, the discoveries made through research at the Experimental Mine at Missouri S&T have changed the world around us.

These days, S&T researchers are helping solve human problems such as finding better treatment for military personnel injured by explosives and improved drug delivery in the body.

# TRAUMATIC BRAIN INJURY RESEARCH

Missouri S&T is the only university in the U.S. with an open-air model for studying blast-induced traumatic brain injuries, and that allows researchers to mimic battlefield conditions.

As part of a federal Department of Defense grant, **Catherine Johnson**, assistant professor of explosives engineering (pictured at left), and her research team are investigating how exposure to explosives affects the brain. They're mapping blast waves that reflect off the ground and damage structures in an explosion.

Working with Johnson is **Barbara Rutter**, a Ph.D. candidate in explosives engineering. While in the Marine Corps, Rutter deployed to Afghanistan in 2012 and witnessed firsthand the effects of traumatic brain injuries (TBIs) on her fellow Marines. Now she studies the relationship between physical building damage and TBI occurrence so that the military can more easily determine if a TBI was sustained after an improvised explosive device (IED) has exploded.

"It's really difficult to quickly assess people's injuries in combat after an IED has gone off," says Rutter. "Being able to give the military an easy guide to identify the severity of the TBI right away allows them to start preventive treatments immediately."

A partnership with the University of Missouri-Columbia School of Medicine allows researchers to use the blast model to better understand behavioral and neuropathological changes to people with blast-induced TBIs. Johnson says the ultimate goal of the research is to eventually improve the quality of life for anyone with a traumatic brain injury, from athletes to car crash victims.

## NANOMATERIAL CREATION WITH EXPLOSIVES

(Above) Catherine Johnson (left) and Bill Fahrenholtz, Curators' Distinguished Professor of ceramic engineering, work together in the Energetics Laboratory.

(Left) The researchers are modifying explosive compositions to maximize their nanomaterial yield and achieve first synthesis of nano-sized alpha variant silicon carbide, which has properties that are critical to the ceramics industry.

Johnson is also working with S&T chemists and ceramic engineers on research aimed at understanding how nanomaterials are made with explosives and creating new kinds of nanomaterials for practical applications, such as silicon carbide for more durable brakes in cars and better bullet-proof vests. She says S&T's small campus allows such full-circle collaborations to occur.

"I like the small campus feel working with ceramics and chemistry," Johnson says. "It's relatively easy to build relationships that allow departments to interact instead of being more segregated."

For many years, scientists have known that they can create nanodiamonds using explosives with a low oxygen balance, which allows for extra carbon in the mix. That extra carbon allows the nanodiamonds to form. S&T researchers are trying to understand at what phase the nanodiamond is formed to better understand the process. In fact, Missouri S&T is the only U.S. institution that can make detonation nanodiamonds.

Researchers also want to create new, beneficial nanomaterials through detonation synthesis. Nanomaterials have high surface areas, which means they can more easily bond with other molecules and move through the body for better drug delivery, for example. Nanomaterials can be cladded or attached to other materials to make them harder or more heat resistant or help them hold heat better.

Johnson's team makes its own charges doped with chemicals, detonates them and sends the collected materials to chemistry and ceramic engineering colleagues on campus for further analysis.

Thanks to funding from the U.S. Army Research Office, Johnson will spend the next three years making new nanomaterials and understanding the mechanisms of how they are formed. ◻

# LEADING THE CHARGE

By Maridel Allinder, allinderm@mst.edu

Start asking questions about explosives engineering at S&T, and it doesn't take long for a theme to emerge:

**LOVE AT FIRST BLAST.**

**Kyle Perry**, S&T assistant professor of mining and nuclear engineering, is the perfect example.

Perry (pictured at right) was studying civil engineering at the University of Missouri-Columbia when he started commuting to Rolla in 2005 to take an explosives class.

"I drove down once a week for labs and Dr. **(Paul) Worsey** would send me his lectures with audio," he says. "I instantly fell in love with explosives."

Perry earned a Ph.D. in mining engineering at the University of Kentucky, where he taught before joining the S&T faculty in 2016. Today, as graduate studies coordinator for explosives engineering, he advises students enrolled in the nation's first master's and Ph.D. programs in explosives engineering.

# "THERE ALWAYS SEEMS TO BE A NEW QUESTION TO ANSWER OR CHALLENGE TO TACKLE."

S&T began offering an explosives engineering minor in 2005, and soon added undergraduate and graduate certificate programs. **Trish Robertson**, Engl'99, MinE'05, was the first student to earn a minor.

"The more I learned, the more intrigued I became," she says. "I spent a Christmas break helping Dr. Worsey with a project at the mine that dealt with explosives. I was hooked. There is so much science behind successful usage of explosives."

The nation's first master's degree in explosives engineering launched in 2010, followed by the first Ph.D. in 2014. **Laurin Bookout**, CE'09, MS ExpE'11, PhD ExpE'15, was the first graduate of the doctoral program, and **Martin Langenderfer**, MinE'16, is a current student.

"There always seems to be a new question to answer or challenge to tackle," says Bookout, who discovered her passion for explosives as an undergraduate and now works in weapons effects testing for ARA, an Albuquerque-based scientific research and engineering firm.

"I got involved in several of Dr. **(Catherine) Johnson**'s research projects as an undergraduate," says Langenderfer. "She asked me if I would like to continue on to graduate school working on a newly funded project. The decision was an easy one."

Paul Worsey, professor and director of explosives engineering, describes the growth of the program as organic.

"We kept adding classes until we had enough for a minor," he says. "Before long, we had enough for a master's."

S&T now offers 20 classes in explosives engineering, a depth of focus unmatched by any other university. Most classes are offered both online and on campus. The number of students with S&T credentials in explosives is significant, particularly for a young program: 142 minors, 50 undergraduate certificates, 139 graduate certificates, 71 master's degrees and three doctorates since the program's inception.

Most students who earn explosives degrees still take jobs in mining, but a growing number work in defense, law enforcement and pyrotechnics.

**Kevin McNeill,** MS ExpE'14, is chief of research and development for the National Center for Explosives Training and Research in Huntsville, Ala., operated by the federal Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF).

"I've worked for the ATF for 18 years," says McNeill. "The education I received at S&T has allowed me to advance into management, establish an excellent research and development program, and build credibility with my peers."

S&T's graduate certificate in explosives engineering is now required training for ATF-certified explosives specialists. The newest degree program, a master's in explosives technology launched this year, is already enrolling students from the ATF and other federal agencies who lack engineering backgrounds but need advanced training in explosives. ◻


Above photos courtesy of the Missouri Chamber. of Commerce

# A PASSION FOR PYROTECHNICS

By Maridel Allinder, allinderm@mst.edu

**Jerry Vaill**, CE'77, MS ExpE'12, had just retired from the U.S. Geological Survey after a 30-year career when he caught an episode of "The Detonators" on the Discovery Channel in 2009. He was surprised to find that the series' hosts, **Paul Worsey** and **Braden Lusk**, MinE'00, PhD MinE'06, had ties to his alma mater.

But what really caught his attention was the nation's first master's degree in explosives engineering.

"Within a few weeks, I was enrolled," Vaill says. "Every kid loves fireworks and some of us never grow out of it."

As a teenager, **Matthew Coy**, MinE'10, MS ExpE'14, PhD ExpE'17, helped his father put on fireworks shows for the local Masonic lodge. At S&T's Jackling Institute, he toured the Experimental Mine and decided on mining engineering as a major. Coy started shooting commercial fireworks as an undergraduate and went on to redesign and teach the Proximate Pyrotechnics course as a graduate student.

"WE ARE PROBABLY THE BEST-EDUCATED EXPLOSIVES TEAM IN THE NATION."


Photos courtesy of the Kansas City Chiefs

When national visual effects company Image Engineering found Coy's LinkedIn profile and contacted him about handling pyrotechnics for a client, the NFL's Kansas City Chiefs, Coy agreed to take the job with the requirement that he and Vaill could operate as a team.

For the past three years, Coy and Vaill have produced the pyrotechnics for the football team's home games at Arrowhead Stadium. Coy creates the flame effects on the field — including the tallest flame in the NFL at 80-100 feet — while Vaill handles aerial displays from the roof.

"We are probably the best-educated explosives team in the nation," says Vaill.

As S&T adjunct faculty members, Coy and Vaill bring professional experience to pyrotechnics classes, where hands-on training is essential.

"You can learn from books and lectures, but you really don't know what's going on until you do it," says Vaill. ◻

# COME TOGETHER

With over 50 sections across the country, the Miner Alumni Association offers an abundance of opportunities for you to expand your professional and social circles. From sporting events to St. Pat's festivities, Miners like you get together year-round to connect and play. Don't miss out on the fun. Check out the events calendar at **mineralumni.com/events**.


Indianapolis Section

## CELEBRATING ST. PAT'S ACROSS THE COUNTRY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Your opinion matters to the Miner Alumni Association, which represents nearly 60,000 alumni. If you have comments, questions or ideas, please share them with your elected representatives listed below.

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# CLASS NOTES

## SHARE A CLASS NOTE

Let your classmates know what you've been doing. Send us information about your professional and personal accomplishments — career changes or promotions, weddings, births and other news — and we will publish it in an upcoming issue. Email your update and a high-resolution photo (if available) to **alumni@mst.edu**.
Deadline:
Spring issue — Nov. 15

## PUBLICATION POLICY

We publish information submitted by alumni, news submitted by employers of alumni, and selected news stories that mention alumni and their affiliation with Missouri S&T. We are happy to announce weddings, births, promotions and other special occasions after they have occurred. We will print addresses if specifically requested to do so by the alumnus/alumna submitting the note and will mention a spouse's name if it is specifically included in the submission. We reserve the right to edit alumni notes and will use submitted print-quality photos as space permits. Due to the production time required for each issue, submissions may take up to six months to appear. Your patience is appreciated.

### 1950

**Melih S. Durusan**, MS CE: "It has been 68 years since I received my master's degree. My years in the U.S. and my country, Turkey, have been satisfying. Now I enjoy being with my daughter, my grandson and his daughter."

### 1951

**William "Bill" Harper**, ChE: "We had our newest great-grandchild, Madelyn, in early November. This made for a nice Thanksgiving. We are both thankful for our family and friends."

### 1953

**William Patterson**, PetE, published his second memoir, *I Can See Back*, available from Amazon. It features St. Pat's stories, including one involving three different young ladies elected to the court of the Queen of Love and Beauty.

### 1960

**Charles Akmakjian**, MetE: "I am on my 20th year of retirement."

### 1961

**Bill Mathews**, CE: "Judy and I celebrated our 51st wedding anniversary in 2017. We enjoy our three grandchildren in Flower Mound, Texas, near our home in Plano. We are still traveling to Europe often on military aircraft as a benefit of my Army Reserve retirement."

### 1962

**Don Burton**, Phys, a scientist in Los Alamos National Laboratory's computational physics division, was named a Los Alamos National Laboratory Fellow.

### 1964

**Milton J. Murry**, EE, MS EE'80: "I'm still teaching classes at Washington University in St. Louis and Jefferson College."

### 1971

**Robert Brinkmann**, CE, was named to the Missouri Highways and Transportation Commission in January. Brinkmann is chief executive officer of Brinkmann Constructors, a member of the Missouri S&T Board of Trustees and a member of the Missouri S&T Academy of Civil Engineers.

**Fred Butler**, MS EMgt, retired as mayor of Issaquah, Wash., and was honored at a reception highlighting his accomplishments.

**Richard Eimer**, EE, retired executive vice president of operations for Dynegy Inc., was named an Honorary Knight of St. Patrick in March 2018.

**Stephen Wiechens**, CE: "I was elected governor of Lions Club in my part of Missouri last year, and now I am an immediate past district governor."

### 1973

**Steven R. Goldammer**, Phys, MS Phys'78, received the Silver Beaver Award from the Silicon Valley Monterey Bay Council of the Boy Scouts of America in recognition of his outstanding service to youth and community.

**Charles McGinty**, ME, a dentist in Joplin, Mo., was honored with the 2017 Missouri Dental Association Distinguished Service Award at the MDA House of Delegates in Jefferson City, Mo.

### 1974

**John Adams**, Chem, was elected chair of the American Chemical Society's board of directors.

### 1979

**Jeff Lewis**, CE, received the 2017 Lifetime Achievement Award from the Federal Highway Administration.

*Continued on page 40*

## VILLANUEVA'S BOOK WINS MULTIPLE AWARDS

*Lynching of Mexicans in the Texas Borderlands*, a book by **Nicholas Villanueva**, Hist'06, earned the National Association for Chicana and Chicano Studies 2018 Non-Fiction Prize. It also earned a 2017 Southwestern Studies Book Prize from the University of Texas and the Border Regional Library Association. Villanueva is an assistant professor of ethnic studies at the University of Colorado-Boulder.

The book examines the increase in Mexican lynchings during the first 10 years of the Mexican Revolution, 1910–20, in the Texas borderlands and differentiates between the lynching of African Americans and the borderland lynching of ethnic Mexicans.

Photo by Andrea Milazzo

# ROKAS PAULAUSKAS: ITALIAN BASKETBALL STAR

**Rokas Paulauskas**, Econ'17, pictured above right, plays center for Italian basketball team AS Magic Basket Chieti, which led its league for much of the 2017–18 season. He scored 17 points in his first game.

While at S&T, Paulauskas was a forward for the Miner men's basketball team, averaging 9.5 points and 7.3 rebounds per game in his first season as a Miner.

## WAGNER WRITES ABOUT 'LAND OF OPPORTUNITY' FOR YOUNG ENGINEERS

**John Wagner**, NucE'92, recently wrote an op-ed detailing how Idaho National Laboratory (INL) offers an opportunity for engineers. The article appeared in the *Magic Valley Times-News* in Idaho. Wagner is associate laboratory director, nuclear science and technology directorate, at the Idaho facility.

"As I contemplated a column for National Engineers Week, my thoughts turned not to the typical newspaper reader, but to their children and grandchildren — our future," wrote Wagner. "I imagine it is difficult for young people to envision themselves as engineers at the nation's lead laboratory for nuclear energy research and development. Yet, INL has an extremely bright future to offer young people; and, if cultivated, engineering can become their passion through which they can make a significant positive difference."

## 1981

**Joe Brinkman**, MinE, MS MinE'82, owner and managing director of Jet Demolition in Johannesburg, South Africa, received the 2017 World Demolition Award for Explosive Demolition at the World Demolition Summit held in London.

## 1982

**Stephanie O'Sullivan**, CE, was named to Peraton's advisory board.

## 1984

**Barry Horst**, CE, was named executive director of the Southeast Missouri Regional Planning Commission.

## 1986

**Jeffery Litherland**, CE, a senior aviation engineer at Hanson Professional Services Inc.'s Sarasota regional office, recently celebrated 10 years of service with the firm.

**Gerald Scott Nall**, CE, MS CE'99: "This marks my 25th year in the Air National Guard. I was promoted to the rank of colonel in May 2016 and assumed command of my unit in November 2016. My unit is the 245th Civil Engineer Flight, North Carolina Air National Guard, based with the 145th airlift wing, Charlotte, N.C. Our gaining commands or 'clients' are United States Air Forces Europe and Air Forces Africa."

## 1987

**Doug Duchardt**, ME, is now chief operating officer at Chip Ganassi Racing.

## 1988

**Andy McDonell**, CE, was promoted to vice president at Brinkmann Constructors. McDonell leads the regional office in Kansas City, Mo.

**Aaron Weatherholt**, CE, joined Hanson Professional Services Inc.'s Springfield, Ill., headquarters. He has a leading role in the advancement of Hanson's Illinois Department of Transportation and local government transportation engineering endeavors and serves as a project manager for transportation engineering projects.

## 1989

**Tracey A. Puthoff**, AE, was named to the 2018 Taft Stettinius & Hollister LLP executive committee.

**John Zimmerman**, CE, was promoted to vice senior associate of TranSystems' Kansas City, Mo., office.

*Continued on page 42*

## WALKING ACROSS AMERICA

# WHILE LIVING WITH PARKINSON'S

Despite his diagnosis of early-onset Parkinson's disease, **Bill Bucklew**, ME'93, walked nearly 3,000 miles across America to raise money for the Michael J. Fox Foundation for Parkinson's Research. During his journey, Bucklew crossed Georgia, Alabama, Mississippi, Arkansas, Texas, New Mexico, Arizona and California. He wore out 26 pairs of shoes, lost 37 pounds, fought off several animal attacks and raised more than $120,000. He has been featured on over 30 television stations promoting the foundation. For more information about his journey visit **uncorkedadventures.org**.

Photo by Stephanie Paddock

## S&T HONEYWELL EMPLOYEES DONATE THE MOST

As part of a competition to see which group of alumni could raise the most donations for a local food bank, S&T grads employed by Honeywell Federal Manufacturing & Technologies in Kansas City, Mo., went all out to win. During Engineers Week at Honeywell, employees competed to see which school's alumni could donate the most toward Harvesters, a local community food network.

S&T grads came out on top, raising a total of $1,704, or 26 percent of all donations, and beating out six other schools. Employees used the money to purchase cans for a Honeywell-wide "can structure" competition for Engineers Week. The money and cans donated to Harvesters equated to 4,042 meals.

## 1990

**Jason Carter**, MetE: "The company I founded in 2010, Aegis Strategies, had a great year. We were named No. 1 Fastest Growing Company in the St. Louis Region by the *St. Louis Business Journal* and made the Inc. 5000 list of 'America's Fastest Growing Companies' for the second year, among other accolades and certifications. We also opened the Cyber Technology and Research Lab as part of our non-profit, the Midwest Cyber Center. It's being used by the U.S. Air Force, various homeschool groups, college students and the general public as a 'live fire' test range for cyber hacking skills."

**John Janchar**, EMgt, was named president of telecom business at Black & Veatch. Janchar, who has been with Black & Veatch since 1990, was one of the first employees assigned to the telecom business when it was formed in 1994.

## 1994

**Robin Lasey**, Chem, was named director of the Arkansas Tech University Center for Excellence in Teaching and Learning.

## 1995

**Mary Helen (Hunter) Stoltz**, Engl, editorial director in marketing and communications at Missouri S&T, was named an Honorary Knight of St. Patrick in March 2018.

## 1997

**Robert Payne**, CE, received the Association of the U.S. Army Award for Excellence in Writing for the National War College class of 2017.

## 1998

**Tracy Beattie**, CE, MS EMgt'01, a lieutenant colonel in the U.S. Air Force, was recently installed as commander of the 577th Expeditionary Prime Base Engineer Emergency Force Squadron at the Al Udeid Air Base in Qatar. Beattie takes over command from Col. **Bryan Opperman**, EE'94.

**Michael Mueller**, AE, MS EMgt'01, was named head of engineering for Comlux Completions in Indianapolis.

## 1999

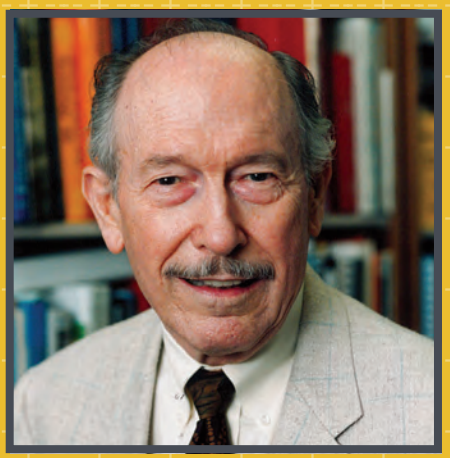
**Danielle (Stone) Kleinhans**, CE, PhD CE'02, was named the 12th president and chief executive officer of the Concrete Reinforcing Steel Institute. She joined CRSI in 2011 as a staff structural and bridge engineer.

## 2000

**Sarah Wiszkon**, GeoE, was selected for the National Council of Examiners for Engineering and Surveying Civil Exam Committee, Geotechnical Subcommittee. Wiszkon was chosen

*Continued on page 45*





# BULLOCK WRITES MINERAL STUDIES HANDBOOK

**Richard Bullock**, MinE'51, MS MinE'55, DE MinE'75, professor emeritus of mining engineering at S&T, edited and wrote parts of *Mineral Property Evaluation: Handbook for Feasibility Studies and Due Diligence*. Published by SME (Society for Mining, Metallurgy and Exploration), the book provides guidelines for performing mineral property feasibility and evaluation studies and due diligence, as well as preparing proper documents for presentations.

# EL-BAZ TO RECEIVE 2018 INAMORI ETHICS PRIZE

**Farouk El-Baz**, MS GGph'61, PhD GGph'64, will receive the 2018 Inamori Ethics Prize from the Inamori International Center for Ethics and Excellence at Case Western Reserve University in September.

El-Baz has played a role in six *Apollo* missions, including the first lunar landing of *Apollo 11*, assisting in landing site selection for each mission. He also created and directs the Center for Remote Sensing at Boston University, which uses space technology to study the earth and its environment, including finding critically needed groundwater in arid regions around the globe. Based on the analysis of space photographs, El-Baz's recommendations resulted in the discovery of groundwater resources in Egypt, India, China, Sudan, the Sultanate of Oman, United Arab Emirates and Chad.

## ROTTY NAMED TO 40 UNDER 40

**Sondra (Terry) Rotty**, ArchE'04, MS EMgt'08, who was recently promoted to project director by Tarlton Corp., has been named to the *St. Louis Business Journal*'s 2018 "40 Under 40" list. Rotty joined Tarlton as a project engineer in 2005. She was featured in *Missouri S&T Magazine*'s Winter 2010 issue as one of S&T's 30 under 30.

## BRADY EARNS WOMEN'S ADVOCATE AWARD

**Meg Brady**, CSci'83, MS CSci'89, a senior director in global learning at Missouri S&T, is the 2018 recipient of the Dr. Elizabeth Cummins Women's Advocate Award at Missouri S&T.

The award, which was established and funded by **Cindy Tang**, Econ'85, is given to any Missouri S&T employee, regardless of gender or job designation, who demonstrates commitment to the women on campus through mentorship and advocacy and by setting an example through professional achievement.

# FUTURE MINERS

1. **Nikolas Moesch**, ME'11, and his wife, **Paige (Vessell) Moesch**, EMgt'13, had a boy, Ezra Charles, on July 4, 2017.
2. **John Stutsman**, EE'77, and his wife, Kathy, are the happy grandparents of future Miner Zoe Alexandria Stutsman, born April 29, 2017.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## MEET ME IN AFGHANISTAN

Brothers **Kevin Schaefer**, EE'96, and **Jeff Schaefer**, EE'98, met in Kabul, Afghanistan, in 2017 for the first time in five years. Both worked on separate ongoing projects to improve infrastructure and advance the country's sustainability.

Kevin is a contracted electrical engineer for the International Security Assistance Force (ISAF), the NATO-led mission in Afghanistan from 2001 to 2015.

Jeff, a Reserve Navy Officer on his second deployment to Afghanistan, is an electrical program manager.

# BEHIND THE MAKEUP

**Nicole French**, ChE'13, a cell manager in L'Oréal's North Little Rock plant, was featured in the sixth episode of the *L'Oréal Talent* podcast. Her interview, titled "Technology, Robots and People at L'Oréal," covered what it's like to produce 500,000 units of mascara a day. French oversees the safety and operation of machinery and equipment. Check out the podcast at **soundcloud.com/lorealcareers**.


Photo by Julie Levin

Photo by Gerald Rogers, U.S. Army Corps of Engineers, Los Angeles District

# ANDERSON HELPS RESTORE POWER TO PUERTO RICO

Capt. **Aaron Anderson**, MS EMgt'13, a civil works project manager with the Portland District of the U.S. Army Corps of Engineers, arrived in Puerto Rico in late November to help restore power to the country hit by Hurricane Maria in fall 2017. Anderson is working with the Federal Emergency Management Agency and the Corps of Engineers Recovery Field Office's temporary power mission to support the Puerto Rico Electric Power Authority.

as the Illinois Department of Transportation Materials representative on the Value Engineering Study for the I-270 Mississippi River Bridge.

## 2002

**Brent Baker**, CE, was named vice president of customer experience for Liberty Utilities. He oversees the customer experience teams in the east, west and central regions of the U.S., as well as Oakville, Ontario.

## 2004

**Nicole Galloway**, Math, Econ, Missouri state auditor, was named an Honorary Knight of St. Patrick in March 2018.

## 2006

**Elizabeth "Beth" Cudney**, PhD EMgt, received the Philip B. Crosby Medal from the American Society for Quality as co-author of *Design for Six Sigma: A Practical Approach Through Innovation*, which she wrote with industry leader Tina Agustiady.

## 2007

**Christopher P. Buterbaugh**, MetE, is now facilities engineer for Chevron's North America Exploration and Production Co. mid-continent business unit in Midland, Texas. Previously, he was the asset integrity and reliability supervisor for Chevron's Asia Exploration and Production Co. based in Nanba, China.

## 2008

**Amy Jones**, EE, received the SAE International/AEM Outstanding Young Engineer Award.

## 2011

**Kristyn Newbern**, EMgt, MS EMgt'13, joined S.M. Wilson as business development manager.

## 2014

**Jennifer Collins**, Engl, was named marketing and advancement director for the Discovery Center of Springfield.

## 2016

**Jonathan Bishop**, ME, joined Wiegmann Associates as project engineer. He is responsible for designing and selecting HVAC systems for client facilities.

**Matthew Klegseth**, ArchE, CE, was named a 2017 Outstanding Student of the Year by the U.S. Department of Transportation's Council of University Transportation Centers. ■

# MINER UNIONS

1. **Austin Keith Granger**, ArchE'16, married Werica Martins DaCruz on Nov. 25, 2017.
2. **Kevin King**, AE'15, married **Michelle Gibson**, EnvE'15, on June 10, 2017.
3. **Michael Pickler**, IST'14, married **Ashley Koesterer**, Bus'14, Econ'14, on Oct. 8, 2017.
4. **David Willey**, CE'14, married Danielle Getsee on Oct. 28, 2017.


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# MINERS REMEMBERED

*Missouri S&T Magazine* will announce deaths when information is submitted by an immediate family member or published in a newspaper obituary. Notification of deaths that have occurred more than two years before the date of publication will not be published unless a special request is made by a family member. Yearbook photos, if available, will be included for alumni when families submit obituary information. Due to the production time required for each issue, submissions may take up to six months to appear. Your patience is appreciated.

## 1941

**Alden G. Hacker**, MetE (Dec. 27, 2017)

## 1943

**H. William Flood**, ChE, was a member of Sigma Nu fraternity and Alpha Chi Omega. He was a veteran of the Army Air Corps during World War II and was a professor of nuclear engineering at the University of Massachusetts Lowell from 1983 to 1995. (Jan. 9, 2018)

**Herbert S. Kalish**, MetE (Aug. 1, 2016)

## 1949

**William H. Shaw**, CE (Aug. 25, 2017)

## 1950

**Louis E. Greco**, ME (Dec. 4, 2017)

**Arthur W. Helwig**, ChE, was a member of Alpha Chi Sigma, Tau Beta Pi and Army ROTC. He served in the U.S. Army Chemical Corps from 1954 to 1956. He worked as a volunteer at the Science Museum of Virginia for 40 years and was chairman of its board of trustees from 1992 to 1999. (Dec. 9, 2017)

**James W. Hughes**, ChE (Oct. 26, 2017)

**George W. Mabie**, ME, was a member of Kappa Sigma fraternity, where he served as president his senior year. After graduation, he joined the U.S. Air Force, where as a first lieutenant he worked as a weapons system engineer. In 1954, he founded Mabie Vac Formed Plastics in St. Louis. Married 61 years, he loved to travel with his wife, Betty. (Nov. 12, 2016)

**Clarence E. Radford**, ME (Jan. 25, 2018)

## 1951

**Raymond F. Cathcart**, MS MetE (Dec. 15, 2016)

**Roger J. Hull**, MinE (Oct. 24, 2017)

**Robert C. Slankard**, CE (Nov. 7, 2017)

## 1952

**J. Roger Scrivner**, CerE (Oct. 18, 2016)

**James E. Walizer**, ChE (Dec. 24, 2017)

## 1953

**Charles M. McDowell**, EE, PhD EE'78 (Nov. 6, 2017)

**Eugene E. "Earl" Strohbeck**, CE, worked for Shell Oil Co. until his retirement in 1989. He designed offshore oil platforms in the Gulf of Mexico, participating in depth-of-water milestones throughout his career. (Jan. 14, 2018)

## 1954

**Kenneth D. Cole**, CE, was a member of Army ROTC, the American Society of Civil Engineers and the Missouri Society of Professional Engineers and was a licensed professional engineer in Maryland and Missouri. He served as an Army combat engineering officer and then as a civil servant in the U.S. Army Corps of Engineers, retiring after 29 years of service. His career included leading the construction of U.S. Air Force runways and missile silos, rocket fueling infrastructure, and engine test stands for the *Apollo* missions. He was area engineer at Wright-Patterson Air Force Base during construction of Walter Reed Army Medical Center and retired as the Baltimore Division chief of supervision and inspection. After retirement, he worked as a consulting engineer for the Government Services Administration and as a deputy project manager for Hill International in the United Arab Emirates. (Nov. 11, 2017)

**Robert A. Horine**, ME (Feb. 18, 2018)

**John D. Knopp**, EE (Dec. 22, 2017)

## 1955

**John McCarthy**, CE, was a member of Blue Key, Chi Epsilon, Tau Beta Pi, Student Council and ASCE. (Jan. 6, 2018)

**David E. Nothstine**, ME (Jan. 30, 2018)

**James Rethmeyer Jr.**, CE (Nov. 5, 2017)

## 1956

**Noble G. Barker**, ME (Nov. 24, 2017)

## 1957

**Norman C. Johnson**, ME (Oct. 22, 2017)

**James J. Ridinger**, EE (Dec. 17, 2017)

## 1958

**Larry C. Atha**, ME, MS ME'60, was a football athlete and a member of Army ROTC. (Jan. 21, 2018)

**William B. Dye**, CE, was a member of Sigma Tau Gamma Fraternity, Chi Epsilon

and Army ROTC. He worked as a civil engineer for Cal Trans. He was a registered California Civil Engineer and worked as chief engineer for the Santa Margarita Water District. (March 12, 2017)

**James L. Hackett**, EE (Feb. 14, 2018)

**John W. Tatman**, ME (Dec. 25, 2017)

**John Weems**, EE (Feb. 11, 2018)

## 1960

**James L. Inglis**, ChE, MS ChE'63 (Dec. 22, 2017)

**Hossein R. Keshari**, ChE (Sept. 29, 2017)

**Thomas A. Seufert**, Phys (Jan. 1, 2018)

**Martin P. Van Grouw**, ME (Jan. 8, 2018)

**Kenneth Wood**, ChE (Nov. 8, 2017)

## 1961

**Anthony J. Jacob**, ME (Dec. 29, 2017)

**Raymond L. Ketchum**, ME (Nov. 21, 2017)

**Robert Saxer**, CE, MS CE'62 (Feb. 14, 2018)

## 1964

**Wendell M. Jones**, CE, was a member of ASCE and the Baptist Student Union. (Oct. 9, 2017)

## 1965

**Robert W. Hellon Jr.**, ChE (Nov. 6, 2017)

**Carl D. Mosher**, ME (Jan. 4, 2018)

## 1966

**Terry W. Alexander**, CE, MS CSci'67 (Dec. 21, 2017)

## 1967

**Charles M. Giraud**, Math (Dec. 6, 2017)

**Michael L. Martin**, CSci, MS CSci'71, worked in the computing organization for the University of Missouri System at the University of Missouri-Columbia campus for 35 years. (Nov. 6, 2017)

**Donald K. Massey**, ME (July 18, 2017)

**Howard W. Myers**, Math (Nov. 23, 2017)

**Richard C. Vedder**, CE, MS CE'69 (Dec. 21, 2017)

## 1968

**David L. Gaines**, CE (Nov. 4, 2017)

**Frank L. Grabski**, CE (Dec. 6, 2017)

## 1969

**Joseph Davis**, MS CE, served in the U.S. Army and worked as a civil engineer for NASA at the Kennedy Space Center for 30 years. (Aug. 24, 2017)

**John T. Lineberry**, ME, MS ME'75 (Jan. 20, 2018)

## 1970

**Gerald W. Burrows**, EE (Jan. 9, 2018)

**Larry C. Carr**, ME (Oct. 24, 2017)

**David P. Chyi**, MS ME (Feb. 1, 2018)

**Steven J. Constance**, EMgt (Oct. 29, 2017)

**James B. Frost**, EMgt (Nov. 20, 2017)

**Clarence D. Little**, MS EMgt (Feb. 1, 2018)

**Gene A. McFarland**, Econ, a member and past president of the South Central Missouri Board of Realtors, was in the real estate business for over 40 years and was a licensed broker in Missouri. He worked for Investment Realty in Rolla for over 33 years. (Jan. 29, 2018)

**Harold I. Persing**, Econ (Nov. 13, 2017)

**James A. Ray**, MS ME (Dec. 27, 2017)

## 1971

**Michael B. Clapper**, EMgt (Dec. 7, 2017)

**William R. Martin**, ME (Jan. 11, 2018)

**Timothy E. Montgomery**, ME (Nov. 19, 2017)

**Paul Schmidt**, EMgt (Nov. 22, 2017)

**George C. Smiley**, EMch (Nov. 12, 2017)

## 1974

**Melvin R. Fulkerson Jr.**, NucE (Jan. 5, 2018)

**Joan M. Wyant**, Engl (Nov. 28, 2017)

## 1978

**Joseph Grana Jr.**, ChE, was a member of Gamma Alpha Delta, Alpha Chi Sigma, AIChE and the St. Pat's Board. (Dec. 9, 2017)

## 1982

**James Craig**, MS EMgt (Sept. 21, 2017)

**David Murphy**, ME, MS ME'90 (Jan. 23, 2018)

## 1984

**Larry Kohrmann**, EE (Oct. 21, 2017)

## 1986

**David C. Hannegan**, EMgt (Dec. 25, 2017)

## 1987

**Horacio M. Aros**, PhD MetE (Nov. 12, 2017)

## 1993

**James Murry**, EMgt (Jan. 21, 2018)

## 1995

**Timothy Schiefelbein**, EE, worked for Raytheon Corp. in Denver. He joined the technical staff at MIT Lincoln Laboratory in Lexington, Mass., in 2001. (Dec. 30, 2017)

## 2004

**Zachary Paul Best**, MetE (Oct. 16, 2017)

## 2006

**Kyle Owen**, CSci (June 4, 2015)

# FRIENDS

**John H. Auble IV** (May 13, 2017)

**Louie E. Bartels**, former S&T student (Feb. 13, 2018)

**Michael T. Beishir**, former S&T student (April 14, 2016)

**Bernice Browning**, wife of the late Charles M. Browning, MinE'48 (Nov. 20, 2017)

**Mary "Peggy" Carney** (Jan. 18, 2018)

**Richard T. Cremer** (Nov. 5, 2017)

**Robert E. Crowley** (Dec. 6, 2017)

**Roy Gabel** (Nov. 12, 2017)

**Elmer E. Hawn** (July 30, 2016)

**Linda L. Leight** (April 4, 2017)

**Ryan M. Lewis**, freshman in civil engineering (Nov. 12, 2017)

**Raymond L. Light**, retired preventative maintenance worker in physical facilities (Dec. 16, 2017)

**Carol Lytle**, wife of Glenn A. Lytle, EE'66 (Sept. 21, 2017)

**Freda Maloney** (Dec. 16, 2017)

**Betty S. Markley** (Nov. 20, 2017)

**John L. Mathias** (Oct. 15, 2017)

**Andrew C. McCullough**, senior in applied mathematics and computer science (Oct. 31, 2017)

**Mary Elizabeth Morgenstern**, wife of the late Richard Morgenstern, MetE'58 (Nov. 9, 2016)

**Carl W. Pietsch** (Jan. 24, 2018)

**Matthew Qualls**, sophomore in economics (Nov. 7, 2017)

**Shirley L. Satterly** (Feb. 3, 2018)

**Bill Stormes** (Nov. 17, 2017)

**Darrel Swaim**, former S&T staff member (Jan. 12, 2018)

**Marjorie Vogeler**, wife of the late Marvin L. Vogeler, a retired S&T employee (Nov. 6, 2017)

**Patricia Ann Warner**, wife of Don L. Warner, dean emeritus of the School of Mines and Metallurgy (Feb. 26, 2018)

**Nichole J. Wescott**, junior in mechanical engineering (Dec. 4, 2017)

**Charles Whitmire** (Dec. 4, 2017)

**Gregory Woods**, former S&T staff member (Jan. 1, 2017)

**Robert B. Young** (Oct. 31, 2017)

**Jacques L. Zakin**, former S&T student (Jan. 16, 2018) □


## FULL COURT PRESS

# FOR MINER PRIDE

John and Kristie Gibson with their dogs, Clementine, Brielle and Daphne. Photo by Rick Ayre

**Kristie (Capps) Gibson**, EMgt'74, and **John Gibson**, EMgt'74, met in Thomas Jefferson Hall after a Miner basketball game. They both came to Rolla on scholarships, Kristie from Dexter, Mo., and John from Kansas City Kansas Community College, where he played basketball.

They married during their senior year, graduated together and went to work as refinery engineers for Exxon Co. USA in Baytown, Texas.

Over the next four decades, through many career moves, they remained connected to Missouri S&T. They were major donors to the Miner Dome dedicated in 2010 and the artificial turf installed on the stadium and intramural fields in 2014.

Now the Gibsons have made a $1 million gift in support of renovations to the arena where S&T's men's and women's basketball teams and women's volleyball team play. Renovations include new flooring, goal systems, a public address system and acoustics.

"Basketball was an important part of my life," says John, who received scholarship offers after playing community college basketball, but none from a university with engineering degrees.

"My coach, Walt Shublom, knew I wanted an engineering degree so he called Coach **(Billy) Key**," says John. Key was Rolla's head basketball coach at the time. "Coach Key came to Kansas City to watch me play and then offered me a scholarship. If I didn't have those two men in my life, I'm not sure where I'd be today."

"I have always valued my experiences at Rolla and especially the education I received," says Kristie, who went on to work for Phillips Petroleum Co. as an engineer, gas buyer and division manager before retiring to raise their daughter, Katie. "I hope, by my example, I perhaps inspired other young women to pursue the engineering profession."

John spent 18 years with Phillips and was executive vice president of Koch Energy when he joined ONEOK, eventually becoming chairman, president and CEO of ONEOK and ONEOK Partners. He retired in 2014 and now serves as non-executive chairman of the $25 billion Fortune 500 company.

"Kristie and I started giving back because we wanted S&T players to have the best possible experience as athletes and students," says John, a former S&T trustee and a member of the Academy of Miner Athletics. "I've always admired the university for making the intercollegiate athletic experience available to as many students as possible."

# POSTCARDS FROM HOME

This tribute to Missouri S&T's hometown adorns the walls of the tunnel that leads from the Residential Commons to the main campus. Mechanical engineering senior **Mercedes Gonzalez** spent 28 hours over three days drawing and painting the mural — even working in the rain to finish the project. Gonzalez has been painting since she was in elementary school and now considers it a nice break from the technical side of her studies.

MISSOURI S&T

Miner Alumni Association
1100 N. Pine St.
Rolla, MO 65409-0650

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**BEYOND MINING**

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## POWER UP YOUR PRIDE AND

# POWER ON THE POSSIBILITIES

There's never been a better time to join the Miner Alumni Association Online Community. Every new member will automatically be entered in a drawing for one of three $50 gift cards to The S&T Store.

All you need is the 10-digit ID number right above your name on this magazine. To register, go to **mineralumni.com/registernow**.

The deadline for registering to win is Sept. 2.

## QUESTIONS?

Email **alumni@mst.edu**
or call 573-341-4145
or 800-JO-MINER.